From pregnancy to parenthood

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Fathers' and mothers' representations of their unborn infants

Charlotte M.J.M. Vreeswijk

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From pregnancy to parenthood
Fathers' and mothers' representations of their (unborn) infants

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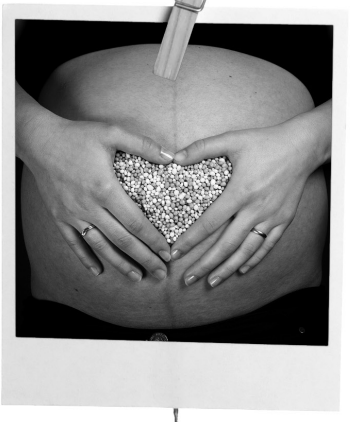

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General Introduction

As adults we cannot consciously remember details of the first months and years of our lives. However, early life experiences are known to have long lasting consequences into childhood, adolescence, and adulthood. Especially the quality of the relationship between an infant and his or her parents has important influences on the child's further life (Cabrera, Shannon, & Tamis-LeMonda, 2007; DeKleyn & Greenberg, 2008; Lyons-Ruth & Jacobvitz, 2008; Rees, 2005; Sroufe, 2005; Sroufe, Egeland, Carlson, & Collins, 2005; Weinfield, Sroufe, Egeland, & Carlson, 2008). In this relationship, an infant learns how to relate to and interact with other people. The parent-infant relationship may therefore be seen as a blueprint or prototype of how the infant engages in future relationships (Fraley, 2002).

To study the quality of the parent-infant relationship, many studies have focused on parental interactive behavior such as sensitivity, structuring, positive and negative regard, or attunement. Stern (1995), however, argued that the parent-infant relationship consists of more than merely observable interactive behavior of parents and infants. The relationship between parent and infant is also shaped by expectations and ideas that both have developed about their daily interactions, the so-called internal representations. Representations are a set of tendencies to behave in particular ways in intimate relationships, based on ideas, fantasies, and schemes of past experiences in daily interactions (Zeanah & Smyke, 2009). According to Stern (1995) it may be illustrative to think of two parallel worlds: "the real, objectifiable external world and the imaginary, subjective, mental world of representations" (p.19). He describes the presence of the real infant in the parents' arms as well as the imagined infant in the parent's mind. The representational world consists of more than the parents' experiences with the infant, but also includes fantasies, hopes, fears, dreams, and predictions for the infant's future. These representations guide parents' behaviors and expectations toward their infants. Relatively few studies have investigated representations parents have of (the relationship with) their infants, even though they are closely related to the quality of parenting behavior, parent-infant interactions, and infant attachment (Korja et al., 2010; Schechter et al., 2008; Sokolowski, Hans, Bernstein, & Cox, 2007; Zeanah, Benoit, Hirshberg, Barton, & Regan, 1994).

Parental Representations of the Infant

Development of Parental Representations

Parents' representations of their infants are ongoing, based on experiences they have with their children, leading up to the present time and continuing into the future. Although most studies of parents' representations are conducted when children are already born, parents generally start to create these mental representations during pregnancy, as they prepare themselves for life with their infant (Ammaniti, Tambelli, & Odorisio, 2013; Benoit, Parker, & Zeanah, 1997; Theran, Levendosky, Bogat, & Huth-Bocks, 2005; Zeanah, Benoit, Barton, & Hirshberg, 1996). During the course of pregnancy, mothers' representations of their unborn infants grow in terms of richness and specificity. This coincides with the time when mothers can start to feel the baby move and have often seen images of the infant

through ultrasounds (Stern, 1995; Viaux-Savelon et al., 2012). Mothers' representations of their infants during pregnancy were found significantly related to their postnatal representations and to postnatal mother-infant interactive behavior and infant attachment (Benoit, Parker, et al., 1997; Dayton, Levendosky, Davidson, & Bogat, 2010; Theran et al., 2005). It is therefore of important clinical relevance to gain more insight into parents' prenatal representations of their unborn children and factors that are associated with the development of optimal prenatal- and postnatal representations of the (unborn) infant.

Psychosocial Factors and Parental Representations

Up until now, several studies have investigated associations between psychosocial factors and parents' (prenatal) representations. Both parental- and child characteristics have been identified that may make it more difficult for parents to create optimal representations of their infants. For example, it was found that mothers with mental health problems more often have suboptimal representations of their (unborn) infants, as well as mothers who experienced domestic violence during pregnancy and mothers of children diagnosed with a medical or psychiatric problem (Benoit, Zeanah, Parker, Nicholson, & Coolbear, 1997; Borghini et al., 2006; Coolbear & Benoit, 1999; Dayton et al., 2010; Huth-Bocks, Levendosky, Bogat, & Von Eye, 2004; Huth-Bocks, Levendosky, Theran, & Bogat, 2004; Korja et al., 2010; Korja et al., 2009; Schechter et al., 2008; Schechter et al., 2005; Theran et al., 2005; Wood, Hargreaves, & Marks, 2004). A further elaboration on what is currently known about associations between parents' representations of their infants and psychosocial factors will be presented in *Chapter 3* of this thesis.

Fathers' Representations

The studies described above, concerning parents' representations of their (unborn) infants, were primarily conducted among mothers. Fathers' representations of their infants have not been examined extensively in existing literature, even though the father-infant relationship is just as predictive as the mother-infant relationship of later socio-emotional, cognitive, and linguistic achievements of children (Lamb, 2010). For example, interesting research by Cabrera, Shannon, and Tamis-LeMonda (2007) showed that supportiveness of both mothers and fathers toward their children during interactions was associated with children's cognitive and language development. Parental warmth, nurturance, and closeness of both parents are associated with positive child outcomes (Lamb, 2010). Child development can therefore not only be related to the quality of the mother-infant relationship, but should be studied within the family context, to which fathers' contributions are equally important (Bretherton, 2010). Many studies on the influence of fathers on child development focus on the quantity of father-child interactions or the different types of roles fathers fulfill within the family (such as breadwinner, caregiver, or playmate) instead of focusing on the emotional quality of the father-child relationship (Lamb, 2010).

In general, distinct patterns are found among fathers and mothers in the amount of time spent with their children and the tasks each parent fulfills within the family. For example, fathers show less overall time commitment, less multitasking, less physical labor, a less rigid timetable, less time alone with children, and less overall responsibility for managing care. On the other hand, fathers will spend more time on interactive activities such as playing, talking, reading, and teaching than mothers. These role patterns were found irrespective of the time parents spend in labor force and included families where mothers work full-time (Craig, 2006). Since the overall quantity and type of father- and mother involvement in childcare differs, it seems unjustified to generalize findings concerning the quality of mother-infant relationships to the father-infant relationship.

It is therefore the aim of this thesis to specifically focus on early mental representations that fathers create of their infants both in the prenatal and postnatal period. During pregnancy, fathers start to create a bond with the unborn infant (Condon, 1993; Righetti, Dell'Avanzo, Grigio, & Nicolini, 2005) and this bond may intensify as the pregnancy progresses (Habib & Lancaster, 2010). Studies specifically focusing on fathers' representations of their (unborn) infants have not yet been published, but among mothers it has been shown that prenatal representations are stable into the postnatal period and that several psychological and contextual factors may influence representations mothers form of their (unborn) infants. To add to the current knowledge of parents' representations of their (unborn) infants, the research questions described below, primarily concerning the development and stability of fathers' representations and their relation to mothers' representations, will be addressed in this thesis.

Research Questions and Outline of the Thesis

The present thesis includes one study protocol, one review, and three empirical studies. After this introductory chapter, *Chapter 2* describes the protocol of the "Expectant Parents" study, a prospective, longitudinal cohort study on which the empirical studies in this thesis were based. For this study, a community-based sample was used to examine the relationship that parents develop with their (unborn) infants during pregnancy and the first year of life. In Chapters 3 to 6, the following exploratory research questions will be examined.

1. What is currently known about parents' representations of their infants in the prenatal and postnatal period? *(Chapter 3)*
2. How do fathers experience the father-infant relationship during pregnancy? *(Chapter 4)*
3. Are fathers' representations of their infants stable from pregnancy into the postnatal period? *(Chapter 5)*
4. What are similarities and differences in distributions of fathers' and mothers' representations of their infants and how are they related to prenatal psychosocial risk factors? *(Chapter 6)*

Finally, a summary of the findings and a general discussion are presented in *Chapter 7*.

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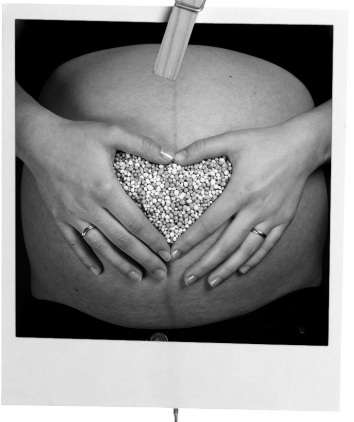

2

"Expectant Parents": Study protocol of a longitudinal study concerning prenatal (risk) factors and postnatal infant development, parenting, and parent-infant relationships

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ABSTRACT

Background: While the importance of the infant-parent relationship from the child's perspective is acknowledged worldwide, there is still a lack of knowledge about predictors and long-term benefits or consequences of the quality of parent-infant relationships from the parent's perspective. The purpose of this prospective study is to investigate the quality of parent-infant relationships from parents' perspectives, both in the prenatal and postpartum period. This study therefore focuses on prenatal (risk) factors that may influence the quality of pre- and postnatal bonding, the transition to parenthood, and bonding as a process within families with young children. In contrast to most research concerning pregnancy and infant development, not only the roles and experiences of mothers during pregnancy and the first two years of infants' lives are studied, but also those of fathers.

Method: The present study is a prospective longitudinal cohort study, in which pregnant women (N = 466) and their partners (N = 319) are followed from 15 weeks gestation, until their child is 24 months old. During pregnancy, midwives register the presence of prenatal risk factors and they provide obstetric information after the child's birth. Parental characteristics are investigated using self-report questionnaires at 15, 26, and 36 weeks gestational age and at 4, 6, 12, and 24 months postpartum. At 26 weeks of pregnancy and at 6 months postpartum, parents are interviewed concerning their representations of the (unborn) child. At 6 months postpartum, the mother-child interaction is observed in several situations within the home setting. When children are 4, 6, 12, and 24 months old, parents also complete questionnaires concerning the child's (social-emotional) development and the parent-child relationship. Additionally, at 12 months information about the child's physical development and well-being during the first year of life is retrieved from National Health Care Centers.

Discussion: The results of this study may contribute to early identification of families at risk for adverse parent-infant relationships, infant development, or parenting. Thereby this study will be relevant for the development of policy, practice, and theory concerning infant mental health.

BACKGROUND

Developmental research has firmly established the quality of the relationship between an infant and his or her parent as an important factor influencing the child's later development (DeKleyn & Greenberg, 2008; Lyons-Ruth & Jacobvitz, 2008; Rees, 2005; Sroufe, 2005; Sroufe, Egeland, Carlson, & Collins, 2005; Weinfield, Sroufe, Egeland, & Carlson, 2008). When children develop a secure relationship with their parents or caregivers in their first years of life, they generally have better cognitive outcomes, better social interactions, display less behavioral problems, and achieve better at school (Thompson, 2008). Research in this area has mainly investigated the attachment relationships that infants form with their parents, thus focusing on the child's perspective of the relationship. In contrast, the attachment relationship from the parent's perspective has not been frequently studied. This concept, also known as *bonding*, may be of equal importance to later child development as the traditionally studied concept of infant-to-parent attachment. More research concerning predictors and long-term benefits or consequences of bonding is therefore needed (Barlow & Svanberg, 2009).

The development of the parent-infant attachment relationship does not start after the child is born, but already evolves during pregnancy (Brandon, Pitts, Denton, Stringer, & Evans, 2009; Raphael-Leff, 2005). The relationship a parent forms with the fetus is often referred to as *prenatal attachment* and has been described as the earliest, most basic form of human intimacy (Condon & Corkindale, 1997). Several definitions of prenatal attachment have been provided, many conceptualized in health research, but it is generally defined as the emotional tie or bond that develops between expectant parents and their fetus (Condon, 1993; Cranley, 1981). Researchers have pointed out that it is important to study prenatal attachment and factors related to its development, since it provides insightful information on later parent-infant bonding (Condon & Corkindale, 1997). Several studies found that the quality of the parent-fetus relationship was related to the quality of postnatal parent-infant relationships (Diane Benoit, Parker, & Zeanah, 1997; Müller, 1996; Siddiqui & Hägglöf, 2000; Theran, Levendosky, Bogat, & Huth-Bocks, 2005). It is assumed that the prenatal parent-infant relationship influences the parent's daily interactions with the child after birth and subsequently affects the quality of the parent-infant relationship and child development.

Next to these feelings of attachment during pregnancy, research concerning the parent-fetus relationship has focused on another concept known as *internal working models* or *representations* of the unborn child (Ainsworth & Bowlby, 1991; Bretherton, 1992). Representations are described as a set of tendencies to behave in particular ways in intimate relationships (Zeanah & Smyke, 2009). They provide information about the 'meaning' a child has to his or her parent by asking the parent about his or her experiences with and perceptions of the fetus, (future) parenting, and the relationship with the fetus. The majority of research concerning internal working models has focused on postnatal representations, while studies on parents' prenatal representations are scarce. Since prenatal representations are found to be related to postnatal representations and postnatal parent-infant interaction, it is important that the quality of prenatal representations and its consequences are also further investigated

(Diane Benoit et al., 1997; Dayton, Levendosky, Davidson, & Bogat, 2010; Theran et al., 2005). In addition, it is unknown whether discrepancies between pre- and postnatal representations lead to parental adjustment problems once the child is born, possibly affecting the quality of postnatal bonding and later child outcomes.

Parent-infant attachment or bonding develops further after birth and continues to develop beyond the early postnatal period (Bruschweiler-Stern, 2009). Surprisingly, empirical research into the determinants, consequences, and stability of postnatal bonding is also limited (Benoit, 2004). Only a few studies have examined predictors and consequences of postnatal bonding and they suggest that prematurity, domestic violence during pregnancy, and maternal postpartum mood are related to adverse maternal bonding and adverse parent-infant interactions (Nicol-Harper, Harvey, & Stein, 2007; Reck et al., 2004; Singer et al., 2003; Zeitlin, Dhanjal, & Colmsee, 1999). Moreover, Brockington, Aucamp , and Fraser (2006) stressed that both severe disturbances, as well as less severe problems with parental bonding may lead to more negative parental care and may subsequently result in various forms of child abuse or neglect. Therefore, several parental, infant, and contextual risk factors are expected to influence the quality of the bonding process.

The present study has been designed to investigate prenatal (risk) factors that may influence the quality of pre- and postnatal parent-infant relationships and postnatal infant development within families with young children. Several determinants and consequences of the early parent-infant relationship will be investigated. Already during pregnancy, prenatal risk factors influencing the quality of the parent-infant relationship and later child development can be identified (Wilson et al., 1996). For example, emotional problems of mothers during pregnancy, problems in mothers' own childhood history, and deficits in parental cognitive functioning increase the possibility of problematic caregiving and child development (Davis et al., 2004; Muir et al., 1989). However, there is still considerable debate and a lack of knowledge about how specific risk factors are related to the long-term benefits or consequences of the parent-infant relationship. In contrast to most research concerning pregnancy and infant development, this study does not only focus on maternal characteristics, but also on the roles and experiences of fathers during pregnancy and the first two years of the infants' lives.

The following topics and research questions related to the parent-infant relationship will therefore be investigated in the current study:

1. The relationship between prenatal (risk) factors, postnatal infant development and quality of the parent-infant relationship. Can specific prenatal risk factors for adverse infant development, parenting, or parent-infant relationships be identified during pregnancy?
2. The transition to parenthood. Is there a discrepancy between the quality of prenatal and postnatal parent-infant relationships and parents' representations of the child? Do parents' prenatal expectations of the child's characteristics meet their postnatal experiences? How are these factors related to infant behavior and development?
3. Parental bonding over time. What are the stability and change in parents' feelings of bonding over time? Is the quality of early parent-infant bonding related to later child development?

METHOD

Enrollment and Informed Consent

Between November 2008 and July 2009, 835 pregnant women were invited by their midwives to participate in this study. Four midwifery practices in Eindhoven, the 5th largest city of the Netherlands, agreed to participate in the study. At the first routine visit (between 9 -15 weeks gestational age), midwives gave mothers information about the purpose of the study and invited them to participate. The oral information was accompanied by a brochure with specific information about the study, which each mother received. If mothers were interested in participation, one of the researchers contacted them by phone to provide additional information and asked whether mothers wanted to enroll in the study. Partners were not directly approached by the researchers but the mothers were informed about the importance of involvement of their partners in the study. After parents received oral and written information about the protocol, both parents were asked for written consent. The informed consent form consisted of three different options. Parents could consent to (1) active participation in the complete research protocol, including two home visits, (2) active participation by filling in questionnaires but not by participating in home visits, or (3) passive participation by allowing the researchers to gather information from the midwife and National Health Care Centers, but without home visits or filling in questionnaires. Separate informed consent forms were sent to mothers and their partners. Once parents returned the signed forms, enrollment in the study was complete.

The "Expectant Parents" ["In Verwachting"] study protocol has been financed and approved by the Netherlands Organization for Health Research and Development (ZonMW, Grant 80-82405-98-074/157001020). It was also approved by the Medical Ethics Committee of St. Elisabeth Hospital Tilburg (date: 13-08-2008, register number: NL 23376.008.08).

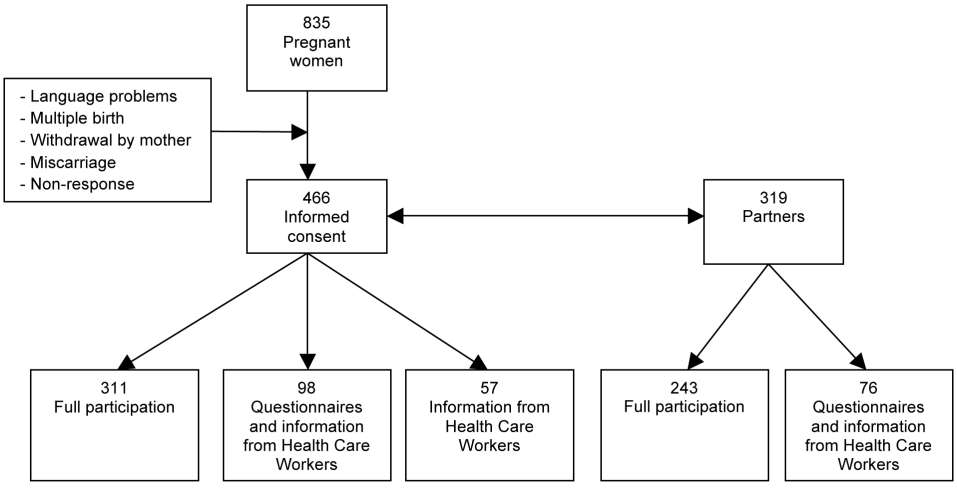

Figure 1 *Flow chart of study population "Expectant Parents".*

Participants

Of the 835 invited women, women with a poor understanding of the Dutch and English language, those expecting multiple births, and women who were over 20 weeks of gestation at enrollment, were excluded from participation. Reasons for not giving written consent were withdrawal by the mother, miscarriage, and non-responding mothers. As Figure 1 demonstrates, this resulted in 466 completed informed consent forms of expectant mothers and 319 informed consents of their partners. All parents hereby gave permission to the researchers to retrieve information about the pregnancy and delivery from their midwives and information about the development of the child in the first year of life from National Health Care Centers. Of these parents, 409 mothers and 319 fathers agreed to complete questionnaires, of which 311 mothers and 243 fathers also agreed to participate during home visits (full participation).

Study Design

The present study is a prospective longitudinal cohort study, in which pregnant women and their partners were followed from 15 weeks gestation until their child was 24 months old. As can be seen in Figure 2, pregnant women completed questionnaires at 15, 26, and 36 weeks gestational age. At 26 weeks of pregnancy, their partners also completed a questionnaire. At the same time a home visit took place during which a standardized interview concerning the prenatal representations of the unborn child was conducted with both parents separately.

Postnatally, there were five more measurement waves (at birth and at 4, 6, 12, and 24 months postpartum). Obstetric information about the birth of the child, including birth weight, Apgar score, and possible complications was registered by the midwives in line with their general practice guidelines. Additionally, midwives provided information about the presence of possible prenatal risk factors within families by completing an adapted Dutch version of the Dunedin Family Services

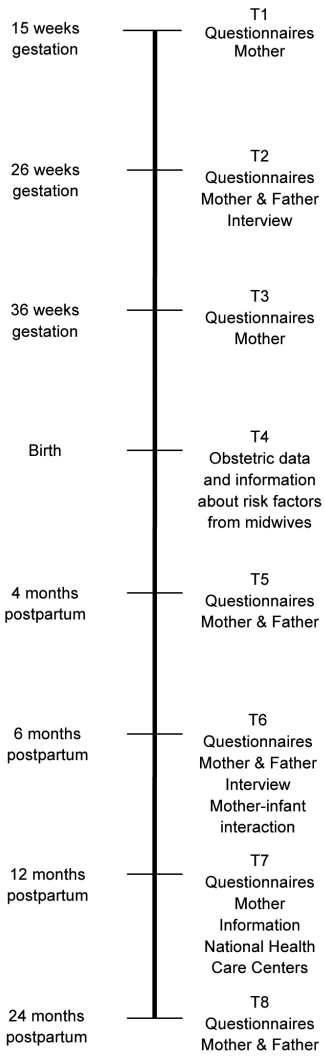

Figure 2 *Time line study protocol "Expectant Parents".*

Indicator (DFSI; Muir et al., 1989). At 4 and 6 months postnatally, both parents received questionnaires. At the child's age of 6 months, an interview about the representations of their child was administered with both parents at their home, and the mother-child interaction was observed in several contexts within the home. Interviews generally lasted between 30 and 60 minutes and the observation of mother-infant interactions lasted approximately 20 minutes. All home visits were video-recorded. When children were 12 months old, mothers completed questionnaires concerning the child's (social-emotional) development, and information about the child's physical development and well-being during the first year of life was retrieved from National Health Care Centers. At the child's age of 24 months, the last measures concerning parental characteristics, the parent-child relationship, and the child's development were completed by both parents.

Study Measures

Figure 3 shows which variables were investigated at different time points during the study. Generally, the study measures can be classified according to whether they concern parental characteristics, infant characteristics, or the parent-infant relationship. Therefore, the selected instruments are described below according to these categories.

Parental Characteristics

Parental characteristics were investigated using self-report questionnaires. To assess parental psychological well-being, the following questionnaires were used: Edinburgh Depression Scale (EDS; Cox, Holden, & Sagovsky, 1987), State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970), Symptom Check List; anxiety, depression, and hostility subscale (SCL-90; Arrindell & Ettema, 2003), Symptoms of Anxiety-Depression index (SAD-4; Denollet, Strik, Lousberg, & Honig, 2006), and Perceived Stress Scale (PSS; S. Cohen, Kamarck, & Mermelstein, 1983).

To assess parents' personality characteristics, the Quick Big Five (QBF; Vermulst & Gerris, 2005), Type D Scale (DS 14; Denollet, 2005), and Ego Resiliency 89 Scale (ER89; Block & Kremen, 1996) were administered. Adult attachment style was measured with the Relationship Questionnaire Clinical Version (RQ-CV; Holmes & Lyons-Ruth, 2006) and the partner-relationship was evaluated with a subscale of the Questionnaire on Family Problems [Vragenlijst voor Gezinsproblemen] (VGP; Koot, 1997).

The Placenta Paradigm Questionnaire (PPQ; Raphael-Leff, 2005) and the Facilitator Regulator Questionnaire (FRQ; Raphael-Leff, 1983) were used to determine maternal orientations on pregnancy and their infants. Midwives used an adapted version of the Dunedin Family Services Indicator (DFSI; Muir et al., 1989) to register the presence of possible prenatal risk factors among parents.

Mothers	Fathers
T1: 15 weeks gestation • Depressive symptoms (EDS + SCL-90) • Anxiety (STAI + SCL-90) • Personality (DS14) • Demographic information	
T2: 26 weeks gestation • Prenatal representations of unborn child (WMCI + PRAM) • Prenatal expectations of infant temperament (ICQ) • Depressive symptoms (EDS + SCL-90) • Anxiety (STAI + SCL-90) • Personality (QBF) • Perceived stress (PSS) • Maternal orientation (PPQ) • Attachment style (RQ) • Prenatal attachment (MAAS)	**T2: 26 weeks gestation** • Prenatal representations of unborn child (WMCI + PRAM) • Prenatal expectations of infant temperament (ICQ) • Depressive symptoms (EDS + SCL-90) • Anxiety (STAI + SCL-90) • Personality (QBF) • Perceived stress (PSS) • Attachment style (RQ) • Prenatal attachment (PAAS) • Personality (DS14) • Demographic information
T3: 36 weeks gestation • Depressive symptoms (EDS + SCL-90) • Anxiety (STAI + SCL-90) • Relationship with partner (VGP) • Resiliency (ER89)	
T4: Birth • DFSI • Obstetric information	
T5: 4 months postpartum • Depressive symptoms (EDS + SCL-90) • Anxiety (STAI + SCL-90) • Personality (QBF + DS14) • Perceived stress (PSS) • Parent-child relationship (PBQ) • Child development (ASQ)	**T5: 4 months postpartum** • Depressive symptoms (EDS + SCL-90) • Anxiety (STAI + SCL-90) • Personality (QBF + DS14) • Perceived stress (PSS) • Parent- child relationship (PBQ) • Resiliency (ER89)
T6: 6 months postpartum • Representations of the child (WMCI + PRAM) • Mother-child interaction (NICHD) • Child temperament (ICQ) • Relationship with partner (VGP) • Mother-infant attachment (MPAS) • Parenting self-efficacy (PMP-SE) • Maternal orientation (FRQ) • Child development (ASQ) • Child social-emotional development (ASQ-SE)	**T6: 6 months postpartum** • Representations of the child (WMCI + PRAM) • Child temperament (ICQ) • Relationship with partner (VGP) • Father-infant attachment (PPAS) • Parenting self-efficacy (PMP-SE)
T7: 12 months postpartum • Depressive symptoms (EDS) • Anxiety (STAI) • Child development (ASQ) • Child social-emotional development (ASQ-SE) • Infant behavior (ITSEA + IBQ-R) • Information from National Health Care Centers T8: 24	
months postpartum • Representations of the child (PRAM) • Mother-infant attachment (MPAS) • Parenting (NOSIK) • Relationship with partner (VGP) • Symptoms of anxiety and depression (SAD-4) • Personality (QBF + DS14) • Attachment difficulties (ADSI) • Infant behavior (ECBQ + BITSEA) • Child cognitive functioning (BRIEF-P) • Demographic information	**T8: 24 months postpartum** • Representations of the child (PRAM) • Father-infant attachment (PPAS) • Parenting (NOSIK) • Relationship with partner (VGP) • Symptoms of anxiety and depression (SAD-4) • Personality (QBF + DS14) • Attachment difficulties (ADSI) • Infant behavior (ECBQ) • Demographic information

Figure 3 *Study protocol and assessments at different time points during the study*

Infant Characteristics

The following questionnaires were used to investigate infant development and behavior: Ages and Stages Questionnaire (ASQ; Bricker, Squires, & Mounts, 1995), Ages and Stages Questionnaire; Social-Emotional (ASQ-SE; Squires, Bricker, & Twombly, 2002), Infant Characteristics Questionnaire (ICQ; Bates, Freeland, & Lounsbury, 1979), Infant Toddler Social-Emotional Assessment (ITSEA; Carter & Briggs-Gowan, 2000), Brief Infant Toddler Social-Emotional Assessment (BITSEA; Briggs-Gowan & Carter, 2002), subscales of the Infant Behavior Questionnaire Revised (IBQ-R; Gartstein & Rothbart, 2003), Early Childhood Behavior Questionnaire (ECBQ; Putnam, Gartstein, & Rothbart, 2006), and Behavior Rating Inventory of Executive Function Preschool version (BRIEF-P; Gioia, Espy, & Isquith, 2002).
Information about the child's physical development and well-being during the first year of life was retrieved from National Health Care Centers.

Parent-Infant Relationship

To determine parents' representations of their (unborn) infant, the Working Model of the Child Interview (WMCI; Zeanah, Benoit, Barton, & Hirshberg, 1996) was conducted during home visits. At the same time, and also at 24 months, the Pictorial Representations of Attachment Measure (PRAM; Van Bakel, Maas, Vreeswijk, & Vingerhoets, 2013), a non-verbal measure of the parent-infant relationship, was administered. To evaluate the quality of mother-infant interactions, the NICHD scales (NICHD, 1999) were used.

In addition, the following questionnaires were used to give insight into the parent-fetus and parent-child relationship: Maternal Antenatal Attachment Scale (MAAS; Condon, 1993), Maternal Postnatal Attachment Scale (MPAS; Condon & Corkindale, 1998), Paternal Antenatal Attachment Scale (PAAS; Condon, 1993), Paternal Postnatal Attachment Scale (PPAS; Condon, Corkindale, & Boyce, 2008), Parental Bonding Questionnaire (PBQ; Brockington et al., 2001), and Attachment Difficulties Screening Instrument (ADSI; Stams et al., 2011).

To evaluate parenting behavior, the following scales were used: the Parental Stress Index [Nijmeegse Ouderlijke Stress Index-verkort] (NOSI-K; De Brock, Vermulst, Gerris, & Abidin, 1992), and Perceived Maternal Parenting Self Efficacy (PMP-SE; Barnes & Adamson-Macedo, 2007).

Data Collection and Management

The logistics of this study were carried out by three researchers (AM, CV, EdC) in close collaboration with the midwives participating in this study. Before starting data collection, a protocol was set up and discussed with participating midwives, to ensure that a uniform protocol was followed by all midwifery practices. Participating midwives were instructed on how to recruit pregnant women for participation in the study and how to register the presence of possible prenatal risk factors.

Questionnaires were sent to parents one or two weeks before the time point they should be completed or before the home-visits. All questionnaires were available in Dutch and

English. Reminders were sent when parents failed to return the questionnaires. Table 1 shows the number of parents that participated at each measurement wave.

The researchers (AM, CV, CR) and a research assistant were trained to administer and code the WMCI, concerning parents' representations of their (unborn) children and to code observations of mother-child interactions. All interviews and mother-infant interactions were video-recorded and coded afterwards. A random subgroup of the interviews and observations was coded by more than one coder, to determine inter-rater reliability.

Table 1 *Number of participants per time point of the study protocol*

Time	Measure	Mothers	Fathers
T1: 15 weeks gestation	Questionnaires	406	-
T2: 26 weeks gestation	Questionnaires	375	299
	Home visit	311	243
T3: 36 weeks gestation	Questionnaires	351	-
T4: Birth	Information concerning the birth	455	-
	DFSI completed by midwife	445	-
T5: 4 months postpartum	Questionnaires	354	274
T6: 6 months postpartum	Questionnaires	341	268
	Home visit	295	225
T7: 12 months postpartum	Questionnaires	299	-
	National Health Care Centers	[a]	[a]
T8: 24 months postpartum	Questionnaires	248[b]	186[b]

Note.

[a] Data currently not complete.

[b] For T8, 285 mothers and 246 fathers were approached.

Data Preparation

Collected data were entered into an electronic database. Random samples of all manually processed questionnaires were double checked by the researchers to monitor the quality of the manual data entry. All measurements were checked by examination of the data, including their ranges, distributions, means, standard deviations, outliers, and logical errors.

Privacy Protection

Databases needed for answering specific research questions were centrally built from databases concerning different time points of the study. All information enabling identification of participants was erased from these databases, except identification numbers of each participant. Video-recordings of participants were stored on the computers of the researchers, which were only accessible with a password, and not on web-based directories.

Statistical Analyses/Power Calculation

To answer the various research questions we will use structural equation modeling, regression analyses (HMR analyses), logistic regression analyses and odds-ratio's. Mediation and moderation analyses will follow Baron and Kenny's requirements (Baron & Kenny, 1986). The power calculation is based on one of the main questions that will be addressed about the effects of prenatal (risk) factors on infant development. Assuming a moderate effect size of .30 or .40, a power of .80 (i.e., the minimal power for a similar study by J. Cohen, 1988), an alpha of .05, and 11 parameters/predictors, we need a sample size of 220 participants (the power will be .83 with p = 11, r^2 = .09 or the power will be .99 with p = 11, r^2 = .16). Abovementioned power calculations are exact calculations, based on results of Gatsonis and Sampson (1989). Allowing for loss to follow-up by 24 months postpartum, we estimated that a sample of at least 240-260 women would be sufficient to test our hypotheses.

DISCUSSION

With this study we aim to gain more insight into the relationships between prenatal (risk) factors, postnatal infant development and the quality of the pre- and postnatal parent-infant relationship. This investigation will lead to more knowledge about the transition to parenthood for both mothers and fathers, and the stability and change in parents' feelings of bonding over time. The longitudinal design with a multi-informant, multi-method approach offers the possibility to predict infant developmental outcomes in the first years of life from pregnancy onwards.

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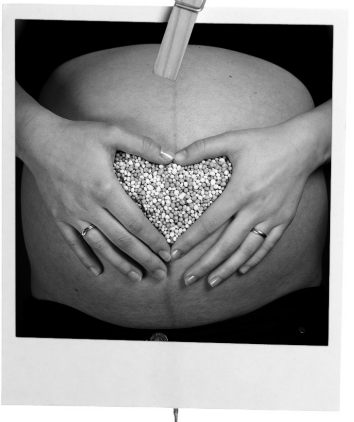

3

Parental representations: A systematic review of the Working Model of the Child Interview

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A.J.B.M. Maas
H.J.A. van Bakel

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ABSTRACT

Background: This review provides an overview of results that have been obtained in studies using the Working Model of the Child Interview (WMCI). The WMCI is a structured interview that assesses parents' internal working models of the relationship with their young children. From the current infant mental health perspective, evaluating the quality of parents' representations about the infant-parent relationship is the main focus in the assessment and treatment of infants and their parents.

Method: Empirical quantitative studies ($N = 24$ articles) in which the WMCI was used for data collection were used for analysis.

Results: The distribution of balanced, disengaged, and distorted representations differed among various study populations. Parents' internal representations as reflected in their narratives about their child are affected by various factors such as maternal, child, and demographic characteristics.

Discussion: The WMCI is a valid and useful clinical and research tool that can be used in future studies examining the role of parental representations in infant development.

BACKGROUND

From the current infant mental health perspective, evaluating the quality of the infant-parent relationship is the main focus in the assessment and treatment of infants and their parents (Zeanah, 2000). Infant-parent relationships are known to have long-term consequences for the physical and psychological health of infants later in life (DeKleyn & Greenberg, 2008; Lyons-Ruth & Jacobvitz, 2008; Rees, 2005; Sroufe, 2005; Sroufe, Egeland, Carlson, & Collins, 2005; Weinfield, Sroufe, Egeland, & Carlson, 2008). Children who develop a secure relationship with their parents or caregivers in their first years of life are known to have better cognitive outcomes, have better social interactions, display less behavioral problems, and achieve better at school (e.g., Thompson, 2008). The relationship between a parent and an infant, however, consists of more than merely interactions between both of them and can be seen as an open system of four major, interconnected components; that is, the infant's and parent's interactive behaviors and the infant's and parent's internal representations (Stern, 1995). A change in one of these components may have an impact on the other three as well. Therefore, assessment of the quality of the infant-parent relationship should focus on observable interactive behaviors as well as on internal subjective experiences, or internal representations, of the relationship of both parent and child (Zeanah, 2000).

The concept of internal representations was originally introduced by Bowlby (1969) to describe the process of storing daily life experiences of interactions with the primary caregiver as memory templates, which are then used to guide behaviors and expectations within other social relationships such as with one's own children. Recently, research has focused more on this topic by investigating internal representations that parents have of their own children (Rosenblum, Dayton, & Muzik, 2009). To examine these parental representations, researchers have started to systematically study subjective narrative patterns of parents when they describe relationship experiences with their infants (Zeanah, 2000). One of the few instruments that has been developed and that has frequently been used to study these subjective narratives is the Working Model of the Child Interview (WMCI). The WMCI is a structured interview that was designed in the mid 1980s because earlier studies had showed that parents' perceptions of their infants are not as objective as previously thought but rather "colored" by the parents' own characteristics and by the expectations that parents had of their children before they were born (Zeanah, Benoit, Hirshberg, Barton, & Regan, 1994). The WMCI focuses on the "meaning" a child has to his or her parent or caregiver by asking the parent about his or her subjective experiences and perceptions of the child, parenting, and the relationship with the child, which subsequently have been found to be related to traditional infant attachment classifications (Benoit, Parker, & Zeanah, 1997; Zeanah et al., 1994). The structure and coding of the WMCI was partly based on and influenced by the earlier development of the Adult Attachment Interview (AAI; Main, Kaplan, & Cassidy, 1985), which focuses on parents' representations of their own childhood instead of representations of the child (Zeanah et al., 1994). Questions of the WMCI are directed at parents' perceptions

of their infant's personality characteristics and behavior, with parents' thoughts and feelings about their infant in specific situations being elicited. Parents are asked about the current situation as well as their past experiences with the child and expectations that they have for the future. The interview takes approximately 45 min to conduct, but individually varies among parents between approximately 30 and 90 min. The interview can be either audio- or video-recorded. The questions of the WMCI should be strictly followed by the interviewer without elaborating on parents' answers. Parents' answers are coded afterwards by trained and reliable coders according to a specific coding scheme (Zeanah et al., 1994).

The coding process of the WMCI consists of three phases. First, representations are coded using six 5-point qualitative scales or features and two content scales. The six qualitative features are Richness of Perceptions, Openness to Change, Intensity of Involvement, Coherence, Caregiving Sensitivity, and Acceptance. These features are mainly scored according to the coder's judgment of the extent to which the features are present during the interview and, to a smaller extent, according to the content of the representation. The two content scales, Infant Difficulty and Fear for Safety, indicate to what extent the parent perceives the child's behavior as difficult and to what extent the parent worries about the child's basic health and safety (Zeanah, Benoit, Barton, & Hirshberg, 1996). Second, the degree to which various affective tones color the caregiver's representation of the infant are scored, such as joy, pride, anger, disappointment, anxiety, guilt, indifference, or other emotions expressed during the interview. Finally, parents' representations are classified into one of three main categories of internal representations: Balanced, disengaged, or distorted. Patterns of scores on the aforementioned scales and affective tones are used to determine the type of internal representation that is present. When a parent has a *balanced* representation of the child, the parent seems to be engrossed in the relationship with the child, appreciates the child's subjective experiences, and values the relationship with the child and the child's individuality. These representations also are open to change as new information about the child becomes available. *Disengaged* representations, on the other hand, are characterized by a sense of coolness, indifference, or emotional distance from the child. The parent distances from the child with excessively cognitive and intellectualized descriptions of the child. In extreme cases, substantial aversion to the child is shown. In this case, descriptions of the child and the parent-child relationship are unelaborated, and parents experience the impact of parenting on the child's development as noninfluential. Finally, *distorted* representations are characterized by internal inconsistencies within the representation, which can, for example, be due to the fact that the parent is preoccupied with other concerns, resulting in an inability to focus incisively on characteristics of the infant. Parents with these representations may have either unrealistic expectations of their children or they are very insensitive to the child. Descriptions of their children are often incoherent, confused, contradictory, or even bizarre. The expressed emotions about the child generally lack contextual meaning (Benoit, Parker, et

al., 1997; Zeanah & Benoit, 1995). Disengaged as well as distorted representations are classified as "nonbalanced representations" (Zeanah et al., 1994).

Most published research reports have focused on parents of infants and toddlers, but in clinical practice, the WMCI also has been used with caregivers of children of older ages. Predominantly, the WMCI is administered postnatally, and parents are asked questions about the relationship they currently have with their child. However, the WMCI also has been conducted prenatally, and parents are then asked about their experiences during pregnancy and expectations of the unborn child (Benoit, Parker, et al., 1997). In the past decades, the WMCI has been proven to be a valuable instrument that can be used both for research purposes and in clinical practice. The interview has been shown to have adequate psychometric properties, and the classifications of the WMCI are strongly related to the traditional classifications of the parent-child attachment relationship as measured in Ainsworth, Blehar, Waters, and Wall's (1978) Strange Situation Procedure (SS). Balanced maternal representations have been found to be related to secure infant attachment, disengaged representations are related to avoidant child attachment, and distorted representations are related to resistant/ambivalent attachment classifications (Benoit, Parker, et al., 1997; Zeanah et al., 1994). One shortcoming of the original WMCI coding scheme is that the WMCI was first conceptualized and developed when only the three types of organized infant and adult attachment were known (i.e., secure/autonomous, avoidant/dismissing, and resistant/preoccupied). No WMCI classification that corresponds to the disorganized/unresolved attachment classification was developed (Crawford & Benoit, 2009). This is a significant limitation, both from a clinical and a research perspective, because recent research has strongly shown that children with a disorganized attachment relationship have an increased risk for developing psychopathology and adverse socio-emotional outcomes (Lyons-Ruth & Jacobvitz, 2008).

The current review provides an overview of results that have been obtained in studies in which the WMCI was used. First, the distribution of balanced, disengaged, and distorted representations in different (clinical vs. nonclinical) study populations will be analyzed. Next, child and parental characteristics which have been found to be related to the distribution of these types of representations in various empirical studies will be discussed. Subsequently, results concerning the relationship between the WMCI and scales of infant and parental attachment and parent-infant interaction will be reviewed. Finally, the use of the WMCI prenatally will be reviewed. and we will present alternative coding methods of the WMCI that were used in several studies.

METHOD

A series of literature searches was conducted using the following online databases: PsychInfo, MEDLINE, PubMed, Science Direct, SpringerLink, and Google Scholar. Keywords that were used were "WMCI" and/or "Working Model of the Child (Interview)." Depending on the search specifications available for each database, either one or both of the search terms were used. Table 1 shows how many "hits" were found after each search and how many abstracts were selected for further reading. For several databases, the number of hits was larger than the number of abstracts reviewed because these hits also included books, dissertations, abstracts in foreign languages, citations, and articles on subjects not related to the WMCI.

After reading the abstracts, articles were selected for further analysis according to the following inclusion criteria: (a) empirical quantitative studies (b) in which the WMCI was used for data collection, and (c) which were available in the English language. Some research groups had published more than one article about the same sample, and these articles were later grouped and presented as one study. After eliminating articles that were found more than once from different databases, 24 different articles met the inclusion criteria for further analysis in this review (see Table 2).

Table 1 *Results of literature search*

Database searched	Keywords (23-06-2010)	No. of hits	No. of articles selected
PsycInfo	"WMCI"	16	17
	"Working model of the child interview"	145	
PubMed	"WMCI"	6	7
	"Working model of the child interview"	18	
ScienceDirect	"WMCI"	37	4
MEDLINE	"WMCI"	6	7
	"Working model of the child interview"	40	
SpringerLink	"WMCI"	6	0
Google Scholar	"WMCI"	385	23
	"Working model of the child interview"	165	

Table 2 *Articles selected for review*

Name first author	Year of publication	Journal	Title
Atkinson, L.	2009	Development and Psychopathology	Attachment and Selective Attention: Disorganization and Emotional Stroop Reaction Time.
Benoit, D.	1997	Infant Mental Health	"Working Model of the Child Interview:" Infant Clinical Status Related to Maternal Perceptions.
Benoit, D.	1997	Journal of Child Psychology and Psychiatry	Mothers' Representations of Their Infants Assessed Prenatally: Stability and Association With Infants' Attachment Classifications.
Borghini, A.	2006	Infant Mental Health	Mothers' Attachment Representations of Their Premature Infant at 6 and 18 Months After Birth.
Coolbear, J.	1999	Infant Mental Health	Failure to Thrive: Risk for Clinical Disturbance of Attachment?
Crawford, A.	2009	Infant Mental Health	Caregivers' Disrupted Representations of the Unborn Child Predict Later Infant-Caregiver Disorganized Attachment and Disrupted Interactions.
Dayton, C.J.	2010	Infant Mental Health	The Child as Held in the Mind of the Mother: The Influence of Prenatal Maternal Representations on Parenting Behaviors.
Huth-Bocks, A.C.	2004	Infant Mental Health	The Impact of Domestic Violence on Mothers' Prenatal Representations of Their Infants.
Huth-Bocks, A.C.	2004	Child Development	The Impact of Maternal Characteristics and Contextual Variables on Infant-Mother Attachment.
Korja, R.	2009	Infant Behavior & Development	Attachment Representations in Mothers of Preterm Infants.
Korja, R.	2010	Infant Behavior & Development	Relations Between Maternal Attachment Representations and the Quality of Mother-Infant Interaction in Preterm and Full-Term Infants.
Minde, K.	2001	American Academy of Child and Adolescent Psychiatry	Nurses' and Physicians' Assessment of Mother-Infant Mental Health at the First Postnatal Visit.
Minde, K.	2006	Infant Mental Health	Culturally Sensitive Assessment of Attachment in Children Aged 18-40 Months in a South African Township.
Rosenblum, K.	2002	Child Development	Maternal Representations of the Infant: Associations With Infant Response to the Still Face.

Rosenblum, K.	2004	Infant Behavior & Development	Videotaped Coding of Working Model of the Child Interviews: A Viable and Useful Alternative to Verbatim Transcripts?
Rosenblum, K.	2008	Infant Mental Health	Reflection in Thought and Action: Maternal Parenting Reflectivity Predicts Mind-Minded Comments and Interactive Behavior.
Schechter, D.S.	2005	Attachment and Human Development	Maternal Mental Representations of the Child in an Inner-City Clinical Sample: Violence-Related Posttraumatic Stress and Reflective Functioning.
Schechter, D.S.	2006	Infant Mental Health	Traumatized Mothers Can Change Their Minds About Their Toddlers: Understanding How A Novel Use of Video Feedback Supports Positive Change of Maternal Attributions.
Schechter, DS	2008	Trauma & Dissociation	Distorted Maternal Mental Representations and Atypical Behavior in a Clinical Sample of Violence-Exposed Mothers and Their Toddlers.
Sokolowski, M.	2007	Infant Mental Health	Mothers' Representations of Their Infants and Parenting Behavior: Associations With Personal and Social-Contextual Variables in a High-Risk Sample.
Sprang, G.	2005	Child Abuse & Neglect	Factors That Contribute to Child Maltreatment Severity: A Multi-Method and Multidimensional Investigation.
Theran, S.A.	2005	Attachment & Human Development	Stability and Change in Mothers' Internal Representations of Their Infants Over Time.
Wood, B.L.	2004	Reproductive and Infant Psychology	Using the Working Model of the Child Interview to Assess Postnatally Depressed Mothers' Internal Representations of Their Infants: A Brief Report.
Zeanah, C.H.	1994	Developmental Issues in Psychiatry and Psychology	Mothers' Representations of Their Infants Are Concordant With Infant Attachment Classifications.

RESULTS

Information about the study design and study population used in each study that was selected for this review is presented in Table 3. The articles are listed in alphabetical order of the first author's last name. As can be seen from Table 3, the WMCI was used in studies that had different research questions, study aims, designs, and research methods and that used different sample populations. In the studies that were reviewed, two distinct scoring methods were used: coding from written transcripts of the WMCI and coding from videotaped interviews. Both methods were found reliable and valid approaches for scoring the WMCI, and substantially converged. The distribution of classifications did not vary according to the scoring methods, Cohen's $\kappa = .79$, $p < .001$ (Rosenblum, Zeanah, McDonough, & Muzik, 2004).

In the next section, we focus first on the distribution of the main WMCI classifications in various study populations. Second, relationships between child and parent characteristics and WMCI classifications are described. Next, we elaborate on the relationship between the WMCI and attachment relationships, and the use of the prenatally administered WMCI and alternative coding methods of the WMCI are discussed.

Table 3 *Study design and study population of selected articles*

First author (year)	Main instruments data collection	Design	Study population and demographics
Atkinson (2009)	Prenatal WMCI, AAI, SS, SCL-90, BDI, EPDS, emotional Stroop tasks	Longitudinal	• *Complete sample:* 102 mothers assessed prenatally and their infants assessed at age 12 months. • *Subsample:* 47 mothers assessed prenatally and their infants assessed at age of 6 months and 12 months (40.4% male). • 83% Caucasian. *M* age mothers = 31.89 years. • Sample was largely middle class.
Benoit (1997) *(Infant Mental Health Journal)*	WMCI	3 Cross-sectional studies	• 99 mothers from three clinical trials (convenience). 45 mothers had infants and toddlers with clinical problems (failure to thrive, sleep problems, patients of infant psychiatry clinic), 54 mothers had infants without clinical problems. • *M* age mothers = 26.66 years. *M* age children = 18.52 months. • *Study 1:* 24 mothers of hospitalized children with failure to thrive (FTT), 25 mothers of hospitalized children growing normally. Mothers were highly stressed, came from impoverished backgrounds, and 49% had not graduated from high school. • *Study 2:* 37 mothers; 16 had children with sleep disorders and 21 control mothers. *Background:* middle to upper middle class. • *Study 3:* 13 mothers of infants referred to infant psychiatry clinic for variety of problems.
Benoit (1997) *(Journal Child Psychology and Psychiatry)*	Prenatal and postnatal WMCI, SS.	Longitudinal	• 96 mothers in third trimester of pregnancy (convenience sample) (*M* age = 29.17 years, 98% married). 80 for postnatal WMCI; 78 complete datasets were available for analysis. • Mothers who did not complete the study had less years of schooling, were younger, and came from lower socio-economic backgrounds. No differences on prenatal WMCI classifications with mothers who completed the study.

Borghini (2006)	WMCI, perinatal risk inventory	Longitudinal	• 50 mothers of premature infants recruited at NICU (24 low medical risk, 26 high medical risk) (48% male), 30 mothers with healthy, full-term controls (43% male) (convenience). • *M* age mothers = 31.1-32.1 for different groups. WMCI administered twice, *M* age of children = 6.2 months and 18.3 months corrected age.
Coolbear (1999)	WMCI, AAI, IFS, IPS	Cross-sectional	• 57 mother-infant dyads; 30 infants with FTT (28 mildly malnourished, 2 moderately malnourished), 27 normally growing infants referred to clinic for other reasons (convenience) (*Age range of children:* 4-36 months).
Crawford (2009)	Prenatal WMCI, AAI, SS, AMBIANCE	Longitudinal	• 35 (*n* = 10 from large metropolitan area, *n* = 25 from smaller city) expectant mothers in third trimester of pregnancy (*M* age = 30.29 years).
Dayton CJ (2010)	Prenatal WMCI, parenting behavior, intimate partner violence	Longitudinal	• 64 expectant mothers in third trimester of pregnancy, with a follow-up when their children were 12 months old.
Huth-Bocks (2004) *(Infant Mental Health Journal)*	Prenatal WMCI, SVAWS, CTS	Cross-sectional	• 206 mothers (convenience); incomplete data: *n* = 4. • 63% Caucasian, 25% African American, 5% Latina or Hispanic, 4% biracial, 3% other minority groups. • *Marital status:* 50% single (never been married), 40% married, 9% separated or divorced, 1% widowed. • *Education:* 45% high-school education or less, 42% some college, 8% bachelor's degree, 5% graduate degree. • 44% experienced domestic violence during current pregnancy, 56% did not. Battered women were younger, less educated, and more likely to be single.
Huth-Bocks (2004) *(Child Development)*	Prenatal WMCI, PAAQ, SS	Longitudinal	• 206 mothers (convenience). • 189 completed all measurements. • *M* age = 25.4 years. 63% Caucasian, 25% African American, 5% Latina or Hispanic, 4% biracial, 3% other minority groups. • *Marital status:* 50% single (never been married), 40% married, 9% separated or divorced, 1% widowed. • *Education:* 45% high-school education or less, 42% some college, 8% bachelor's degree, 5% graduate degree. • WMCI administered in third trimester of pregnancy, SS administered when child was 12 to 13 months.

Korja (2009)	WMCI, EPDS	Cross-sectional and longitudinal analyses	• 38 preterm infants and 45 healthy, full-term infants, and their mothers. All were firstborn, singleton children of native Finnish-speaking mothers. *M* age mothers = 28.3 and 28.2 years. • EPDS administered when infants were 6 months (corrected) age, WMCI conducted when infants were 12 months (corrected) age.
Korja (2010)	WMCI, PCERA	Cross-sectional and longitudinal analyses	• 38 preterm infants and 45 healthy, full-term infants, and their mothers. All were firstborn, singleton children of native Finnish-speaking mothers. *M* age mothers = 28.3 and 28.2 years. • PCERA administered when infants were 6 and 12 months (corrected) age, WMCI conducted when infants were 12 months (corrected) age.
Minde (2001)	WMCI, SCL-90 , EPDS, DIPH, Interview covering relationship with own parents and spouse	Cross-sectional	• 45 mother-infant dyads. • *M* age mother = 27.6 years; infants were 4-7 weeks old; 40% of mothers had one or more previous abortion, 14% physical and/or sexual abuse, 25% family history of personal psychiatric contacts.
Minde (2006)	WMCI, SCL-90, AQS during observation of mother-child interaction	Cross-sectional	• 46 children (50% male) between 18-40 months and their mothers (convenience sample). • *M* age children = 29.4 months, *M* age mothers = 28.7 years. • All mothers reported financial difficulties, 39% of severe nature. 80% of mothers did not work, 46% reported history of abuse, 35% had been placed away from home for > 3 months before age of 5 years.
Rosenblum (2002)	Modified version of the WMCI, SPF, CES-D	Cross-sectional	• 100 mother-infant dyads. *M* age mother = 28.7 years. • 77% European American, 15% African American, 5% Asian, Latina, biracial, or other. 77% married, 11% unmarried but living with the father, 10% never married, 1% divorced, 1% living with another partner. • 29% employed full-time, 25% part time, 46% at home. • Children were seen at 7 months of age; home and laboratory visit.
Rosenblum (2004)	WMCI	Cross-sectional	30 mothers (*M* age mother = 30 years). 83% European American, 14% African American, 3% Asian, Latina, biracial, or other.
Rosenblum (2008)	WMCI, RF, CES-D, mother-infant interaction	Cross-sectional	95 mothers of 7-month-old infants (*M* age mothers: 29.3 years).

Schechter (2005)	WMCI, RF, PCLS, SCID	Cross-sectional	• 41 mothers of children registered in a hospital-based infant mental health clinic specializing in families at risk for child abuse (referrals) (*M* age mothers = 29 years, *M* age children = 32 months). • *Mothers:* 88% Hispanic and 12% African American; 68% on Public Assistance; 54% less than high-school education; 67% single mothers. • All mothers exposed to interpersonal violent trauma in childhood as victim or witness; 71% experienced violent trauma during adulthood.
Schechter (2006)	WMCI, RF, PCLS, SCID, BDI, CAVES, MARS	Longitudinal	• 32 mothers of children registered in a hospital-based infant mental health clinic (referrals) (*M* age mothers = 30 years. *M* age children = 32 months). • 88% Hispanic and 12% African American; 75% on public assistance; 52% less than high-school education; 67% single mothers. • All mothers exposed to interpersonal violent trauma in childhood as victim or witness.
Schechter (2008)	WMCI, RF, PCLS, SCID, AMBIANCE	Cross-sectional	• 41 mother-toddler dyads registered at a hospital-based mental health clinic for very young children (referrals) (*M* age mothers = 29 years, *M* age children = 32 months). • 88% Hispanic and 12% African American, 68% on Public assistance, 54% less than high-school education, 67% single mothers. • 59% of mothers stated their child was one of the three greatest stressors in their lives. • All mothers exposed to interpersonal violent trauma in childhood as victim or witness.
Sokolowski (2007)	WMCI, CTS, BSI, PCOG	Cross-sectional	• 100 African American mothers and their children (convenience). • 78 mothers lived in public housing, 22 in nearby private-sector housing. 92% of the mothers lived in female-headed households at time of study. • *M* age mothers = 24.7 years; *M* age of mothers at time of having first child = 17.8 years. Age range of children: 17-20 months.

Sprang (2005)	WMCI, BSI, SCID, CAPI, SASSI, TRS, CBCL, CDI, (REEL/FIRST), FSC, PSI, FACES	Cross-sectional	• 215 parents (44.9% male, 55.1% female), 166 children (47.9% male, 52.1% female) (convenience). • Parents reported by state public child welfare organization for abuse or neglect • *M* age parents = 28.1 years, *M* age children = 6.46 years. • Children: 63% Caucasian, 29.4% African American, 2% biracial, 7.1% Hispanic, 1.8% other background. • *Severity of maltreatment:* 19.7% extreme, 38.9% severe, 12.5% moderate, 28% mild. • 36.1% neglect, 5.3% medical neglect, 46.6% physical abuse, 12% sexual abuse.
Theran (2005)	Prenatal WMCI, WMCI, Maternal caregiving (observation), SVAWS, CTS, BDI	Longitudinal	• 206 women, third trimester of pregnancy. Final study sample = 180 (after 1 year). • *Excluded mothers:* economically less off, more children, more nonbalanced in pregnancy. • 44% women were physically abused during pregnancy. • 63% Caucasian, 24% Black/African American, 4% biracial, 5% Hispanic, 1 % Asian Pacific, 1% Native American, 2 % other. • *M* age mother = 25 years. • 48% single, 41% married, 11% separated, widowed, or divorced; 44% first-time mother.
Wood (2004)	WMCI, SCID	Cross-sectional	• 8 British mothers at high risk for postnatal depression (convenience). • *M* age = 32.9 years. • 6 White, 2 Black. • *Socio-economic status:* largely middle class. • *Marital status:* 2 single, 6 married or cohabiting.
Zeanah (1994)	WMCI, SS	Cross-sectional	• 45 mother-infant dyads. • *M* age mother: 29.9 years. • Infants were 12 months old; 57% boys, 43% girls. • 43% firstborn, 31% second-born, 26% third-born.

Note: AAI = Adult Attachment Interview; AQS = Attachment Q-sort; AMBIANCE = Atypical Maternal Behavior Instrument for Assessment and Classification; BDI = Beck Depression Inventory; BSI = Brief Symptom Inventory; CES-D = Center for Epidemiological Studies-Depression Inventory; CAPI = Child Abuse Potential Inventory; CBCL = Child Behavior Checklist; CDI = Child Depression Inventory; CAVES = Clinician Assisted Video-Feedback Exposure Session; CTS = Conflict Tactics Scale; DIPH = Demographic Information and Psychiatric History; EPDS = Edinburgh Postnatal Depression Scale; FACES = Family Adaptability and Cohesion Evaluation Scale; IFS = Infant Feeding Scale; IPS = Infant Play Scale; FSC = Kempe Family Stress Checklist; MARS = Maternal Attributions Rating Scale; PCERA = Parent-Child Early Relational Assessment; PCOG = Parent-Child Observation Guide; PSI = Parenting Stress Index; PAAQ = Perceptions of Adult Attachment Questionnaire; PCLS = Posttraumatic Stress Symptom Checklist-Short Version; REEL/FIRST = Receptive-Expressive Emergent Language Scale; RF = Reflective Functioning; SVAWS = Severity of Violence Against Women Scales; SPF = Still Face Procedure; SS = Strange Situation; SCID = Structured Clinical Interview for the *DSM-IV*; SASSI = Substance Abuse Subtle Screening Inventory; SCL-90 = Symptom Checklist-90-R; TRS = Trauma Recovery Scale; WMCI = Working Model of the Child Interview.

Distribution of Different Types of Representations

In 14 articles, information is given about the distribution of postnatal balanced, disengaged, and distorted representations among study populations. The size of the populations in these 14 studies varied between 8 and 206 parents per study. Combining the results of these studies offers more insight into the distribution of different types of representations among a larger group of parents.

In total, distributions of 912 representations are reported in 14 studies (Benoit, Parker, et al., 1997; Benoit, Zeanah, Parker, Nicholson, & Coolbear, 1997; Borghini et al., 2006; Coolbear & Benoit, 1999; Korja et al., 2010; Korja et al., 2009; Minde, Tidmarsh, & Hughes, 2001; Rosenblum, McDonough, Muzik, Miller, & Sameroff, 2002; Schechter et al., 2008; Schechter et al., 2005; Sokolowski, Hans, Bernstein, & Cox, 2007; Theran, Levendosky, Bogat, & Huth-Bocks, 2005; Wood, Hargreaves, & Marks, 2004; Zeanah et al., 1994). When different articles reported information about the same study population, the sample characteristics were included only once in the analysis (Korja et al., 2010; Korja et al., 2009; Schechter et al., 2008; Schechter et al., 2005). In addition, participants with incomplete data (i.e., when the WMCI was not conducted postnatally) were not included in these calculations. The study samples described in the selected papers were divided into groups according to the clinical status of the infant and/or the mother: a nonclinical (comparison) group, a clinical infant group in which infants were diagnosed with a medical or psychiatric problem, and a clinical group of mothers diagnosed with mental health problems. If more than one study population was described in one article (e.g., if representations of mothers of healthy children were compared to those of mothers of children with a clinical diagnosis), results were analyzed separately for the clinical and nonclinical groups. In the nonclinical group (n = 513), 53% of parents' representations were balanced, 21% were disengaged, and 26% were distorted. Three studies were conducted with parents of children at risk due to medical or psychiatric problems, such as children born prematurely, children with Failure to Thrive (FTT), or children with sleep disorders. In this latter group (n = 170), 22% of the WMCIs were classified as balanced, 34% as disengaged, and 44% as distorted. Finally, when parents were at risk due to having psychiatric disorders or problems or when they had a history of abuse (i.e., three studies with n = 229), 34% of the representations were coded as balanced, 23% as disengaged, and 43% as distorted.

As can be seen from Table 4, in nonclinical populations, approximately 53% of the mothers have balanced representations while in the clinical groups, most representations are classified as disengaged (23-34%) and distorted (43-44%). The difference in distribution rates between clinical and nonclinical groups is significant, $\chi^2 = 64.00$, $df = 4$, $p < .001$. The difference between the distribution of balanced and nonbalanced representations also remains significant when comparing the nonclinical population to a clinical population where either the child or parent has clinical problems, $\chi^2 = 53.81$, $df = 1$, $p < .001$ (see Table 5).

The aforementioned information describes the distribution of the WMCI classifications in different populations. A limitation in interpreting the results is that the information may

be partially incomplete due to the failure of some studies to report the actual distributions of WMCI classifications found in their study samples (Rosenblum, McDonough, Sameroff, & Muzik, 2008; Schechter et al., 2006; Sprang, Clark, & Bass, 2005).

Table 4 *Distribution of types of representations across different populations*

Representation	Nonclinical group *n* (%)	Clinical group: Infants *n* (%)	Clinical group: Mothers *n* (%)
Balanced	270 (52.59)	38 (22.33)	77 (33.67)
Disengaged	108 (21.08)	58 (34.20)	53 (23.33)
Distorted	135 (26.33)	74 (43.61)	99 (43.00)
Total *N*	513	170	229

Table 5 *Balanced and nonbalanced representations across different populations*

	Nonclinical group *n* (%)	Clinical group *n* (%)
Balanced	272 (53.02)	115 (28.82)
Nonbalanced	241 (46.98)	284 (71.18)
Total *N*	513	399

Relationship Between Child Characteristics and WMCI Classifications

Six of the studies described in this review had examined the relationship between maternal representations and child characteristics, in which especially representations of mothers of infants in clinical settings were evaluated. Benoit, Zeanah et al. (1997) and Coolbear and Benoit (1999) reported on maternal representations of mothers of infants with FTT. FTT is generally viewed as a syndrome characterized by (a) weight-for-age at or below the fifth percentile on standardized growth charts, (b) weight less than expected for height, and (c) a deceleration in the rate of weight gain from birth to the present (weight decrease of at least 2 *SD*s on growth charts) (Altemeier, O'Connor, Sherrod, Yeager, & Vietze, 1985; Benoit, Zeanah, & Barton, 1989; Drotar & Eckerle, 1989; Gorman, Leifer, & Grossman, 1993). In these studies, groups of mothers of infants diagnosed with FTT were compared to comparison groups. Mothers of children with FTT less often had balanced representations of their children. The difference between mothers of infants with FTT and the comparison group was not statistically significant in Benoit, Zeanah et al.'s study (1997) while in Coolbear and Benoit's study (1999), mothers of children with FTT showed more nonbalanced representations. Benoit, Zeanah et al. (1997) argued that the lack of significance may be due to the relatively small sample size ($N = 49$). Coolbear and Benoit's sample, however, was only marginally larger ($N = 57$). Note that in Benoit, Zeanah et al. (1997), mothers of infants with FTT are likely to have disengaged representations while in Coolbear and Benoit's study (1999), these mothers showed more

distorted representations. The contrasting results suggest that in clinical samples, making a distinction between disengaged and distorted representations may be less meaningful than is evaluating specific details of the representation since both disengaged and distorted representations imply that parents react insensitively toward their infants (Coolbear & Benoit, 1999; Zeanah et al., 1997).

Benoit, Zeanah et al. (1997) also studied maternal representations among mothers of infants with sleep disorders and infants referred to an infant psychiatric clinic for other developmental problems or risks, including cases of suspected and documented maltreatment (Benoit, Zeanah, et al., 1997). Mothers of infants in a clinical setting more often had disengaged and distorted representations than had mothers of infants in the control groups, showing less empathic appreciation of the child and his or her individuality. Since the study had a cross-sectional design, it does not provide information on the direction of the relationship between variables. Hence, the question remains whether nonbalanced maternal representations contribute to, or result from, infant clinical problems.

A specific group of parents who were administered the WMCI are parents of infants who were born prematurely. Prematurity may affect parent-infant attachment processes in various ways; for example, having a premature infant has been found to be associated with higher amounts of stress for parents and higher risks of adverse child development (Pierrehumbert, Nicole, Muller-Nix, Forcada-Guex, & Ansermet, 2003). In two studies by Borghini et al. (2006) and Korja et al. (2009), mothers of premature infants were compared to mothers of healthy, term children. Borghini et al. (2006) compared representations of mothers of low-risk premature infants (< 33 weeks gestational age without medical complications), high-risk premature infants (< 33 weeks gestational age with medical complications), and healthy, term infants. When their infant was 6 months old, mothers of healthy, term children more often had balanced representations whereas mothers of low-risk premature children more often had disengaged representations, and mothers of high-risk premature children more often had distorted representations. When their infant was 18 months old, mothers of healthy, term children still had more balanced representations, and mothers of high-risk premature infants more often had balanced representations than did mothers of low-risk premature infants (Borghini et al., 2006). On the other hand, Korja et al. (2009) found that mothers of 12-month-old premature children showed a similar distribution of the types of representations as did the mothers of term children, where both mothers of term infants and mothers of premature infants generally had balanced representations. This difference may be explained by confounding factors such as differences in socio-economic backgrounds and family structures in the study groups (Korja et al., 2009).

One study concerning child characteristics and WMCI classifications was based on a community sample and examined the relationship between maternal representations and infant's emotion regulation using the Still Face Procedure (Rosenblum et al., 2002). This study revealed that children of mothers with balanced representations showed more positive

affect, more attention-seeking behavior, and more contact maintenance compared to children whose mothers had disengaged or distorted representations. This association was mediated by parenting behavior, with mothers having balanced representations showing more positive affect and mothers with distorted representations showing more rejecting behavior. Maternal representations, as assessed with the WMCI, uniquely explained variance in infant affect regulation beyond the contribution of maternal depressive symptoms, $R^2 = .35$, $p < .01$.

Relationship Between Parental Characteristics and WMCI Classifications

In addition to child characteristics that may affect maternal representations, it is important to consider maternal characteristics as well. Infant attachment classifications also have been found to be related to psychological well-being of mothers (Coyl, Roggman, & Newland, 2002). For example, a meta-analysis on early maternal depression and infant-mother attachment has shown that children of depressed mothers less often form secure attachment relationships with their mothers and are at risk for disorganized attachment (Martins & Gaffan, 2000). However, as mentioned earlier, when the WMCI was developed, the disorganized type of attachment classification had not been distinguished, and therefore no WMCI classification that corresponds to disorganized attachment was included in the original WMCI coding scheme. To assess the amount of maternal depressive symptoms in relation to maternal representations, mainly self-report measures (i.e., questionnaires) were used. Only Wood et al.'s (2004) study –with a very small sample size ($N = 8$)– involved using a clinical interview for diagnosis of depressive symptoms. Minde et al. (2001) also showed that mothers with higher levels of depressive symptoms more often had nonbalanced than balanced representations of their children. More specifically, Rosenblum et al. (2002), Wood et al. (2004), and Korja et al. (2009) showed that mothers with higher levels of depressive symptoms more often had distorted representations. Sokolowski et al. (2007) did not find a similar relationship between depressive symptoms and maternal representations, but found that when mothers reported more general feelings of hostility, they had increased odds of having distorted or disengaged representations. In their narratives, mothers who reported more hostile feelings on the Brief Symptom Inventory (Derogatis & Melisaratos, 1983) generally showed more disappointment, anger, difficulty, and indifference in their narratives. They also portrayed less positive features such as joy, acceptance, sensitivity, and intensity of involvement when they described their children (Sokolowski et al., 2007).

Studies by Schechter et al. (2008; 2005) specifically focused on the presence of violence-related posttraumatic stress among mothers and its effect on maternal representations, and revealed that the amount of symptoms of posttraumatic stress disorder (PTSD) did not differ between mothers with balanced and nonbalanced representations. However, they found significantly more and severe PTSD symptoms among mothers with distorted representations than among mothers with disengaged representations. In addition, mothers with more

severe PTSD symptoms were more likely to maintain a physical and/or psychological distance from their children. This may be due to traumatized mothers having a strong need to protect themselves from further dysregulation, particularly when a child is distressed (Schechter et al., 2008; Schechter et al., 2005).

Few studies have reported data on relationships between demographic characteristics and maternal representations, and found inconsistent results. In two studies, maternal representations were found to be affected by mothers' educational backgrounds (Huth-Bocks, Levendosky, Theran, & Bogat, 2004; Sokolowski et al., 2007) while other studies have not found effects of educational background or socio-economic status (Korja et al., 2009; Schechter et al., 2008; Schechter et al., 2005). The cultural orientation of mothers was found related to responses on the WMCI and to the way their representations are coded (Minde et al., 2001). Because of the limited studies that have applied the WMCI in cultural groups and because of the small sample size of this study, the roles of demographic and cultural influences on the WMCI need to be interpreted carefully.

Relationship Between WMCI Classifications and Measures of Attachment and Interaction

Past research has shown that a mother's capacity to mentalize about her child is related to her own attachment experiences and attachment history as well as to infant attachment classifications (Fonagy & Target, 2005). As mentioned earlier, the infant-parent relationship can be evaluated according to several interconnected components, including interactive behaviors and internal representations of both the infant and the parent (Zeanah, 2000). In two studies, the concordance between maternal representations and infant attachment quality was examined using the SS procedure (Benoit, Parker, et al., 1997; Zeanah et al., 1994). The SS is a widely used and recognized procedure to measure the quality of the parent-infant relationship according to the child's behavior in a structured, stressful experiment (Ainsworth et al., 1978). Benoit, Parker, and Zeanah (1997) and Zeanah et al. (1994) showed that there is substantial overall concordance between balanced representations and secure attachment, between disengaged representations and avoidant attachment, and between distorted representations and resistant/ambivalent attachment, Cohen's $\kappa = .40$, $p < .001$ and Cohen's $\kappa = .50$, $p < .01$, respectively. The association between maternal representations and infant attachment is particularly strong for the balanced-secure relationship and seems to be weakest for the disengaged-avoidant relationship (Benoit, Parker, et al., 1997; Zeanah et al., 1994). Moreover, mothers with securely attached infants generally had higher scores on the WMCI features Richness of Perceptions, Openness to Change, Coherence, and Sensitivity (Zeanah et al., 1994). These studies did not provide information about the relationship between the WMCI and disorganized child attachment as measured in the SS because of a lack of a disorganized equivalent in the WMCI.

More recently, Korja et al. (2010) showed that maternal representations also are related to the observed quality of mother-infant interactions in both term infants and premature infants. A better quality of infant, maternal, and dyadic interaction at 6 and 12 months of infant's corrected age was related to balanced representations of the mothers when the children were 12 months of age. Distorted maternal representations were more strongly related to nonoptimal mother-infant interaction than were disengaged representations, including less optimal quality of play and attention skills in infants and higher levels of dyadic disorganization and tension (Korja et al., 2010).

Differences in parenting behavior have been observed between mothers with balanced, disengaged, and distorted representations. Mothers with disengaged representations were found to differ from mothers with balanced and distorted representations; the former showing less sensitivity and responsiveness, encouragement, and guidance. They also were more passively withdrawn in interactions (Sokolowski et al., 2007). The frequency of atypical maternal behavior shown during mother-infant observations, including hostile-intrusive behavior and negativity toward the infant, was found to be higher among mothers with distorted representations (Schechter et al., 2008).

Quality of the mother-infant relationship and child attachment classifications also seem to be related to mother's own attachment relationships, particularly toward her own parents (e.g., Van IJzendoorn, 1995; Ward & Carlson, 1995). However, contrasting results have been reported when comparing mothers' own relationship histories and the representations they have of their children. Sokolowski et al. (2007) for example, found that mothers who reported having had more relational conflicts with their own mothers on the Conflict Tactics Scale (Straus, 1979) had increased odds of having disengaged or distorted representations of the relationship with their infants as measured with the WMCI. Minde et al. (2001) did not find a relationship between WMCI classifications and mothers' responses to questions about the relationship with their own mother, as assessed by the Demographic Information and Psychiatric History (DIPH; Minde & Minde, 1986). However, Minde et al. (2001) found that mothers with balanced representations reported better relationships with their own fathers and less relational conflicts on the DIPH. Maternal representations of their children may be partially influenced by the relationships in the past that mothers had with their own parents. Because the AAI is generally considered the "gold standard" for classifying the quality of the attachment relationship with one's own parents, the aforementioned results using other and more distal measures of adult attachment need to be interpreted with caution.

Use of the Prenatal Version of the WMCI

The WMCI is mainly used postnatally with parents of children ranging from 4 weeks to 6 years of age. As mentioned earlier, several studies have administered the interview during pregnancy, generally during the third trimester. In studies using both the prenatal and the postnatal WMCI, the main focus is on associations between prenatal and postnatal internal representations, parent-infant interactions, later infant attachment, and parents' own

attachment representations. Assessed during pregnancy, a total of 298 representations are reported in five studies. The distribution of prenatal WMCI classifications is 62.0% balanced, 17.5% disengaged, and 20.5% distorted (Benoit, Parker, et al., 1997; Dayton, Levendosky, Davidson, & Bogat, 2010; Huth-Bocks, Levendosky, Bogat, & Von Eye, 2004; Huth-Bocks, Levendosky, Theran, et al., 2004; Theran et al., 2005). The distribution rates are in accordance with those found in postnatal samples. However, among women who had experienced domestic violence during pregnancy (n = 91), the distribution of representations showed a somewhat distinct pattern: 33% balanced, 41% disengaged, and 26% distorted. Disengaged and distorted representations are more prevalent among these women. In the interviews, these mothers were less open and less coherent in their narratives, and were less sensitive in the perceptions of their unborn children. Moreover, they tended to see themselves as less competent and showed more negative affect when talking about their children (Huth-Bocks, Levendosky, Theran, et al., 2004).

Concordance between prenatal and postnatal maternal representations is strongest for balanced representations (Benoit, Parker, et al., 1997; Theran et al., 2005). It appears that women with a lower income, single parents, and women who experience physical abuse during pregnancy are more likely to shift from balanced representations prenatally to nonbalanced representations postnatally. In contrast, mothers who have fewer depressive symptoms, higher incomes, and were married or lived together with the same partner are more likely to shift from nonbalanced prenatal representations to balanced postnatal representations (Theran et al., 2005). Even when maternal representations were measured during pregnancy, later infant attachment could be predicted in 74% of the cases (Benoit, Parker, et al., 1997).

As with the postnatal version of the WMCI, concordances between prenatally administered interviews and postnatal mother-infant interactions have been examined. With regard to the relationship between prenatal representations and postnatal outcomes, balanced mothers show higher levels of positive parenting behaviors after birth whereas prenatally disengaged mothers show more controlling behaviors, and distorted mothers show more hostility and anger in interactions (Dayton et al., 2010). More specifically, mothers who had nonbalanced representations during pregnancy and balanced representations after birth show less sensitive behavior, are more disengaged, and show less warmth and affection than do those who had balanced representations at both time periods. In addition, Theran et al.'s (2005) study, with complete data of 180 mothers, showed that women who shift from balanced representations prenatally to nonbalanced representations postnatally show more sensitive and less controlling behavior during observations of mother-infant interactions when infants were 1 year old. They also experience more joy when interacting with their children than did women who had nonbalanced representations at both time periods. Therefore, having a balanced prenatal representation seems to buffer the quality of interaction with the child postnatally (Theran et al., 2005).

When considering relationships between prenatal maternal representations and mothers' own attachment experiences and attachment histories, Huth-Bocks et al. (2004) found that when mothers recalled more negative attachment experiences during their own childhood,

they generally had less balanced prenatal representations in the narratives of the WMCI. In this study, mothers' attachment experiences were measured with the Perceptions of Adult Attachment Questionnaire (Lichtenstein & Cassidy, 1991), a measure designed to assess attachment dimensions with scales and items that are based on the AAI. The relationship between mothers' own attachment experiences and prenatal representations was confirmed in a study by Atkinson, Leung, Goldberg, Benoit et al. (2009), using the AAI; however, this study used an alternative scoring method of the WMCI, which makes it difficult to compare the findings with those found in other studies. Fewer balanced prenatal representations also were found when more prenatal risk factors were present, including low socio-economic status, low income, single parenthood, and domestic violence (Huth-Bocks, Levendosky, Bogat, et al., 2004). Results from these prenatal studies have indicated that maternal variables, rather than infant characteristics, contribute strongly to the representations mothers have of their children.

Use of Alternative Coding Methods of the WMCI

As described earlier, a coding manual for the WMCI was developed, and training is needed to become a reliable coder. In several studies, the WMCI was used and coded according to alternative methods, making it difficult to compare results of these studies. One study with maltreating parents had used only the qualitative features described in the manual of the WMCI and found that representations of maltreating parents to be generally impoverished in detail, coherence, sensitivity, and acceptance (Sprang et al., 2005). Because of the lack of reporting the three main categories, the results of that study could not be used in this review.

The coding of the WMCI heavily relies on the judgment of the coder about the process of the interview, the meaning of language, and a range of signs and symptoms related to social behavior and interaction in Western countries. One study has examined the effects of a culturally sensitive coding manual to the distribution of different classifications of the WMCI. This study was conducted among mothers living in a Black township of Johannesburg, South Africa. Maternal representations were analyzed according to the original American coding scheme (WMCI-US) and a local coding scheme. Infant observations were conducted in this study, after which observers completed an Attachment Q-Sort (AQS; Waters, 1995) to classify infant attachment behavior. Concordance between the AQS and the WMCI-US coding was substantially lower than that between the AQS and the WMCI-local coding. This implies that scoring the WMCI may require culturally appropriate scoring systems (Minde, Minde, & Vogel, 2006).

In addition to the three original classifications, propositions have been made to add a fourth classification to the coding scheme. Atkinson et al. (2009) used an additional category called "irrational fear for infant's safety" to classify maternal representations. This category reflects a confused, dissociated, and irrationally fearful state during the WMCI. Of the mothers in this sample, 21.57% were classified as showing such irrational fear, which was shown to be

related to unresolved maternal attachment on the AAI and to infant disorganized attachment in the SS (Atkinson et al., 2009).

Crawford and Benoit (2009) also added a distinct fourth type of classification to the original coding scheme of the WMCI, labeled disrupted. As mentioned earlier, the original balanced, disengaged, and distorted WMCI classifications show concordance with secure, avoidant, and resistant/ambivalent infant attachment, respectively. A (representational) equivalent of disorganized attachment, characterized by the display of contradictory behaviors on the SS, however, is lacking in the original coding scheme. The WMCI-Disrupted (WMCI-D) classification system as proposed by Crawford and Benoit can be used in addition to the original coding scheme, implying that all representations can be classified as either "disrupted" or "not disrupted". This new WMCI-D scale and classification is based on and includes items similar to those identified by Lyons-Ruth, Bronfman, and Parsons (1999) using the Atypical Maternal Behavior Instrument for Assessment and Classification (AMBIANCE) which reflect disrupted caregiver behavior, associated with disorganized attachment. It has been shown that atypical or disrupted behavior as assessed with the AMBIANCE is specifically related to infant attachment disorganization whereas general maternal sensitivity has been found to be related to attachment security (Moran, Forbes, Evans, Tarabulsy, & Madigan, 2008). Attachment insecurity and disorganization in particular are linked to negative socio-emotional outcomes later in life (Egeland & Carlson, 2004; Van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). When applied to prenatal maternal representations in the third trimester of pregnancy, the WMCI-D has been proven to give valuable and unique information about representations, which is different from the three original classifications. The WMCI-D also was significantly associated with mothers' presence of unresolved mourning or trauma on the AAI and with disorganized infant attachment on the SS at the infants' age of 12 months (Crawford & Benoit, 2009).

Finally, the WMCI also has been used to assess a construct called Reflective Functioning (RF), another attachment-related factor which represents a parent's ability to think about what the child might be thinking and feeling. To assess RF, several extra probes are added to the original WMCI script to elicit parents' thinking about the child's mental states (Rosenblum et al., 2008; Schechter et al., 2008; Schechter et al., 2005; Schechter et al., 2006). Schechter et al.'s (2005, 2006, 2007) research mainly focused on symptoms of posttraumatic stress following interpersonal violence. When women had higher levels of RF, their representations were four times more likely to be classified as balanced than as nonbalanced. RF was lowest among women with disengaged representations (Schechter et al., 2005). A higher level of RF predicted greater responsivity to a video-feedback intervention to decrease maternal negativity toward her child (Schechter et al., 2006). In Rosenblum et al.'s (2008) study, mothers with higher RF were more sensitive and less rejecting, angry, anxious, and intrusive during interactions with their infants. It is plausible that mothers with different levels of RF create different social environments for infants, corresponding with differences in the ability to help infants make sense of their own internal experiences (Rosenblum et al., 2008).

DISCUSSION

With this review, an overview is given of the research that has been conducted with the WMCI to date. The purpose was to gain insight into variables that are associated with parents' internal representations of their children as measured with this interview. Parents' internal representations of their infants, as reflected in narratives obtained by the WMCI, are related to various factors including maternal, child, and demographic characteristics.

In general, balanced representations were more common among nonclinical parent-infant dyads while disengaged and distorted representations were more common when either the infant or the parent was faced with medical or psychiatric problems. Mothers of premature infants, infants with FFT, infants with sleep disorders, and infants seen in an infant psychiatric clinic, but also mothers experiencing domestic violence or a major depressive disorder, more often had nonbalanced representations of their children (Benoit, Parker, et al., 1997; Benoit, Zeanah, et al., 1997; Borghini et al., 2006; Coolbear & Benoit, 1999; Korja et al., 2009; Minde et al., 2001; Rosenblum et al., 2002; Schechter et al., 2008; Schechter et al., 2005; Sokolowski et al., 2007; Theran et al., 2005; Wood et al., 2004; Zeanah et al., 1994). These results highlight that when either the parent or the infant experiences problems, this may put a strain on the parent-infant relationship, as reflected in the parent's internal representation of the child. Therefore, eliciting parental representations of the infant with the WMCI can provide important information that can be used as a starting point for interventions aimed at improving the parent-infant relationship and infant behavior, where nonbalanced representations on the WMCI can be seen as risk conditions for maladaptive developmental trajectories. As mentioned earlier, these results are based on studies that vary in sample size; therefore, one should be careful in generalizing these results.

This review shows that mothers with distinct representations showed different interactive behaviors toward their children. Overall, mothers with balanced representations had more positive and pleasurable interactions than did mothers with disengaged or distorted representations. The interactions of mothers with disengaged representations were marked by an overall passivity, and mothers with distorted representations were characterized by more intrusiveness, negativity, and rejection of the child (Rosenblum et al., 2002; Schechter et al., 2008). Mothers who were less sensitive did not encourage or stimulate their children and did not guide their children's actions during mother-infant observations (Sokolowski et al., 2007). It also has been shown that general maternal sensitivity is related to organized attachment security and that atypical parenting behavior is related to infant attachment disorganization (Moran et al., 2008). Attachment insecurity and disorganization in turn are linked to more negative socio-emotional outcomes later in life (Egeland & Carlson, 2004; Van IJzendoorn et al., 1999); therefore, in clinical practice, interventions focused on altering parents' internal representations may be beneficial in improving the way parents approach and interact with their children, hence stimulating a more secure and organized infant attachment.

In studies where the WMCI was administered prenatally, substantial concordance was found between mothers' prenatal and postnatal internal representations and between mothers' prenatal representations and postnatal mother-infant attachment on the SS (Atkinson et al., 2009; Benoit, Zeanah, et al., 1997; Huth-Bocks, Levendosky, Bogat, et al., 2004; Theran et al., 2005). This means that when mothers (prenatally) show nonbalanced representations of the fetus, they have a higher chance of developing an insecure relationship with the infant. Postnatal interventions aimed at improving infant attachment are generally more successful at altering parental insensitivity than in changing children's attachment (Van IJzendoorn, Juffer, & Duyvesteyn, 1995). However, to date, no attachment-based intervention –aimed at improving parental sensitivity– has been shown to promote secure-organized attachment when applied during pregnancy and the first 6 months of the child's life (Bakermans-Kranenburg, Van IJzendoorn, & Juffer, 2005). Therefore, it would be interesting to examine whether an intervention specifically focused on modifying the parent's representation during pregnancy would yield better results since it would be aimed at specific beliefs and experiences of the parent during pregnancy. Applying the newly developed WMCI-D (Crawford & Benoit, 2009) may be valuable and promising in this regard as well. A direct focus on disrupted attributions and biases may be sufficient to prevent disorganized attachment and its negative outcomes where traditional attachment-based interventions do not seem to be effective in preventing disorganized attachment (Bakermans-Kranenburg et al., 2005).

Note that further research is needed in several domains concerning the implications of the WMCI. Until now, studies that have used the WMCI had relatively small sample sizes; therefore, replications of the studies with larger samples are needed. As with studies using the SS, normative data of the distribution of balanced, disengaged, and distorted representations in different populations is badly needed. Moreover, further research is needed to evaluate complementary and promising coding schemes that have been developed in the past years, such as the newly developed WMCI-D scale and then relating this scale to disorganized attachment on the SS and to unresolved mourning or trauma on the AAI (Crawford & Benoit, 2009). When considering that the classification of maternal representations may depend on parents' cultural backgrounds, it also is important that researchers and clinicians in different countries and with different cultural backgrounds critically examine whether the existing Western classification scheme, which is primarily based on North American samples and populations, is applicable to their study population. Research also has not yet focused on factors that may shape prenatal representations and how these prenatal representations are transmitted to the child after birth. Finally, only one study using the WMCI has included mothers and fathers in their study sample (Sprang et al., 2005). However, the authors refrained from reporting whether paternal representations differed from maternal representations of the child. While many fathers play an increasing role in the upbringing of children in the first years of age, future research should focus on examining gender differences in parental representations of children at different ages and the impact of fathers' representations on children's socio-emotional outcomes.

Although relationships between representations and mother-infant attachment have been found in several studies, and maternal representations significantly predict infant attachment (Atkinson et al., 2009; Benoit, Parker, et al., 1997; Crawford & Benoit, 2009; Huth-Bocks, Levendosky, Bogat, et al., 2004; Zeanah et al., 1994), more studies are needed to increase evidence in these areas. The influence of mother's own attachment history on the representations of her child also deserves more attention, such as more thoroughly examining the relation between the WMCI and the AAI. In addition, there is a lack of studies that have focused on the relationship between maternal representations and other domains of infant development (i.e., motor or mental development, behavioral problems and infant temperament, and focusing on parents of older children, e.g., school-aged children or adolescents).

The current review is based on studies using the WMCI in a variety of settings and with diverse populations. Many of the areas covered include only one study or a few studies that have examined outcomes, and links with the WMCI classifications are sometimes based on a small sample size. Although we think that the number of studies published using the WMCI is sufficient and warrants this review, we need to be cautious in interpreting the results. Until now, conclusions have been difficult to generalize to large populations due to the small number of studies and sample sizes available. Nevertheless, the WMCI is a valid and useful clinical and research tool that can be used in future studies examining the role of parental representations in infant development.

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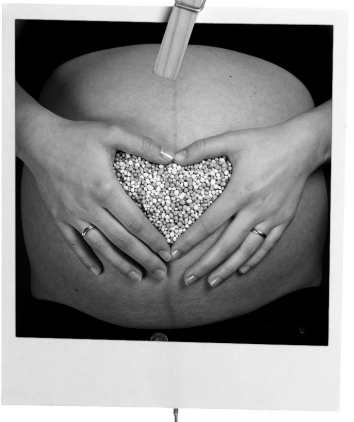

4

Fathers' experiences during pregnancy: Paternal prenatal attachment and representations of the fetus

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ABSTRACT

Background: Positive attachment experiences during infancy are linked to positive developmental outcomes of children later in life. The parent-infant relationship does not start upon the birth of the child, but already evolves during pregnancy. In this exploratory study, fathers' experiences during pregnancy are investigated, focusing on their relationship with the unborn baby.

Method: At 26 weeks gestational age, expectant fathers from a Dutch community-based sample (N = 301) completed questionnaires concerning feelings of attachment to the fetus and psychological well-being. The semistructured Working Model of the Child Interview was conducted to assess the "meaning" the unborn child has to the father (i.e., the internal representation of the fetus).

Results: Results show that the quality of fathers' prenatal attachment and their representations of the fetus were interrelated. Fathers who reported a higher quality of prenatal attachment were more likely to have balanced representations of their unborn children, whereas fathers with a lower quality of attachment were more likely to show disengaged representations. Furthermore, the quality of fathers' self-reported prenatal attachment was higher when fathers experienced fewer symptoms of depression and anxiety during pregnancy, when they were younger, and when they expected their first child. These factors were not significantly related to fathers' internal representations of the fetus.

Discussion: Further research is needed to examine the effects of the prenatal father-infant relationship on postnatal father-child attachment, infant behavior, and infant development.

BACKGROUND

Over the past decades, research concerning the parent-infant relationship has predominantly focused on mothers. This could be attributed to the societal role patterns in the mid-20th century, where mothers were generally seen as the primary caregivers who stayed home and took care of their children, while fathers worked outside of the home to financially provide for the family. Nowadays, however, these traditional role patterns are less prevalent in Western society. This is reflected in more mothers working part-time or full-time outside of the home, and fathers often taking a more active role in the upbringing of their children (Amato, Meyers, & Emery, 2009; Lamb & Tamis-Lemonda, 2004; Maume, 2011). For many years mothers were seen as the most important attachment figure in the child's life, but with increasing role differentiation, the father's role has become more and more important (Lamb & Tamis-Lemonda, 2004; Van IJzendoorn & De Wolff, 1997).

Studies investigating the role of the father in child development have focused on a range of different aspects of fathers and the father-child relationship, such as paternal emotional well-being, father-child attachment, and the quality of father-child interactive behavior (Grossmann, Grossmann, Fremmer-Bombik, Kindler, & Scheuerer-Englisch, 2002; Hjelmstedt & Collins, 2008; Lundy, 2002; Paquette, 2004; Ramchandani, Stein, Evans, & O'Connor, 2005; Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008; Schoppe-Sullivan et al., 2006; Trautmann-Villalba, Gschwendt, Schmidt, & Laucht, 2006; Van IJzendoorn & De Wolff, 1997). Overall, these studies have shown that fathers' active and regular engagement with their children has a positive effect on children's social, behavioral, psychological, and cognitive development later in life (Sarkadi et al., 2008). Specific paternal factors that contribute to later child development are fathers' depressive symptoms, the quality of play sensitivity, and paternal responsiveness (Fletcher, Freeman, Garfield, & Vimpani, 2011; Grossmann et al., 2002; Ramchandani et al., 2005; Trautmann-Villalba et al., 2006). More emotional and behavioral problems among children have been found when fathers experienced more depressive symptoms, if they were less responsive, or if they were less sensitive during interactions with their children.

Even though research has come to show that fathers have an important influence on the development of their children (Grossmann et al., 2002; Lamb, Hwang, Frodi, & Frodi, 1982; Williams & Kelly, 2005), little research has focused on the *early* father-child relationship. A study by Ramchandani et al. (2013) recently found disengaged and avoidant interactions of fathers with their infants, as early as the third month of life, to predict early behavioral problems in children. However, the early relationship already starts to evolve before the child is born (Brandon, Pitts, Denton, Stringer, & Evans, 2009; Raphael-Leff, 2005). Therefore, the current study investigates fathers' experiences during pregnancy, specifically focusing on the relationship they have with their unborn child.

Guiding Theoretical Framework: The (Prenatal) Parent-Infant Relationship

Parental warmth, nurture, and closeness of both mothers and fathers are associated with positive child development. When children have secure, supportive, and sensitive relationships with their parents, they are generally better psychologically adjusted than children who have less satisfying relationships with their parents (Belsky, Garduque, & Hrncir, 1984; DeKleyn & Greenberg, 2008; Grossmann et al., 2002; Lamb et al., 1982; Lyons-Ruth & Jacobvitz, 2008; Rees, 2005; Sroufe, 2005; Sroufe, Egeland, Carlson, & Collins, 2005; Weinfield, Sroufe, Egeland, & Carlson, 2008; Williams & Kelly, 2005). In shaping the quality of the parent-child relationship, individual parental characteristics such as parental warmth, nurture, and closeness are considered to be more important than parent gender (Lamb & Tamis-Lemonda, 2004). Additionally, a meta-analysis by van IJzendoorn and de Wolff (Van IJzendoorn & De Wolff, 1997) has shown that the quality of attachment relationships that infants form with their fathers and mothers may differ and that attachment appears more relationship-specific than infant-specific. This means that children may either form an (in)secure relationship with both of their parents, but could also form a secure relationship with one parent and an insecure relationship with the other one. There seems to be no difference, however, in the frequency of secure attachment relationships with fathers and mothers (Van IJzendoorn & De Wolff, 1997).

Even though the concept of parent-infant attachment has received quite a lot of attention, relatively few studies have focused on the parent-infant relationship during pregnancy. During this time, parents psychologically prepare themselves for life with their child. In this process, they generally develop expectations of the future and start to have ideas and fantasies about (life with) the unborn baby (Benoit, Parker, & Zeanah, 1997; Theran, Levendosky, Bogat, & Huth-Bocks, 2005; Zeanah, Benoit, Barton, & Hirshberg, 1996). Although this period is an important time of transition for fathers-to-be, studies concerning parents' relationships with the unborn baby during pregnancy have mainly focused on experiences of mothers. Slade, Cohen, Sadler, and Miller (2009) argued that, during pregnancy, fathers may face several challenges. Genesoni and Tallandini (2009) refer to pregnancy of the partner as the most difficult period in terms of psychological adjustment. Fathers are, on one hand, expected to develop representations of the unborn baby and to build an attachment relationship with a child they have not met. While, on the other hand, they do not experience the same physiological changes women undergo during pregnancy. This may make the pregnancy less tangible. In this phase, it may be hard for fathers to experience the unborn baby as a real child. Besides that, fathers may experience changes in the relationship with their partner as well as several stressors specifically associated with pregnancy, such as concerns for the wellbeing of the unborn child and the mother (Dunkel Schetter, 2011; Whisman, Davila, & Goodman, 2011). These challenges may be time-consuming and may preoccupy the father, negatively influencing the relationship he is able to form with the unborn baby. In mothers, the parent-fetus relationship was found to be related to the quality of the postnatal mother-

infant relationship (Benoit et al., 1997; Mary E. Müller, 1996; Siddiqui & Hägglöf, 2000; Theran et al., 2005). There is a lack of knowledge about the relationship that fathers form with their unborn babies during pregnancy, even though this, like for mothers, may also have important implications for the father-infant relationship once the child is born.

Research of the mother-fetus relationship has mainly focused on two different theoretical concepts. The first concept is known as *prenatal attachment*, which focuses on behaviors, attitudes, thoughts, and feelings that demonstrate care and commitment toward the fetus (Van den Bergh & Simons, 2009). Prenatal attachment can be described as the unique relationship that develops between parent and fetus. This relationship may be represented by an affiliation and interaction with the unborn baby and the desire of the parent to know and to be with the unborn baby (Brandon et al., 2009). Maternal prenatal attachment is usually measured by self-report questionnaires, such as the Maternal Fetal Attachment Scale (Cranley, 1981), Maternal Antenatal Attachment Scale (MAAS; Condon, 1993), and Prenatal Attachment Inventory (PAI; M.E. Müller, 1993; Van den Bergh & Simons, 2009). Condon (1993) has developed a questionnaire to specifically examine the prenatal attachment of fathers toward the unborn baby, known as the Paternal Antenatal Attachment Scale (PAAS). This instrument has been used in several studies and consists of two subscales. The subscale *quality of attachment* represents affective experiences such as closeness/distance and tenderness/irritation toward the fetus. The subscale *intensity of preoccupation* represents the amount of time fathers spend thinking about, talking to, dreaming about or palpating the fetus.

A second concept that is often used to study the mother-fetus relationship concerns the internal working models mothers have of their unborn children. This concept is based on the principles of attachment theory (Ainsworth & Bowlby, 1991; Bretherton, 1992). Internal working models or representations of relationships are a set of tendencies to behave in particular ways in intimate relationships (Zeanah & Smyke, 2009). Representations are ideas, fantasies, and schemes that are based on experiences in daily interactions. Representations that mothers develop of their unborn children can be assessed through their subjective narrative patterns when describing experiences with the fetus (Zeanah, 2000). These representations provide information about the "meaning" a child has to his or her mother. The mother is asked about her experiences with and perceptions of the fetus, (future) parenting, and the relationship with the fetus. Prenatal representations were found related to postnatal representations mothers have of their infants, traditional infant attachment classifications, and the quality of postnatal mother–infant interactions. When mothers have balanced prenatal representations, they more often have balanced postnatal representations. They also demonstrate more positive parenting, and their children show more optimal and secure attachment relationships (Benoit et al., 1997; Dayton, Levendosky, Davidson, & Bogat, 2010; Theran et al., 2005).

One of the few instruments designed to study prenatal representations of the infant, is the Working Model of the Child Interview (WMCI; Zeanah et al., 1996). This is a semistructured

interview used to elicit parental ideas, expectations, and experiences about the (unborn) child and the relationship with the child. With the WMCI, prenatal representations can be classified into one of three different types of representations: Balanced, disengaged, or distorted. When a parent has a *balanced* representation of the unborn baby, (s)he seems to be engrossed in the relationship with the baby and the representation is open to change as new information about the baby becomes available. *Disengaged* representations are characterized by a sense of coolness, indifference, or emotional distance from the baby. Descriptions of the baby and the parent's relationship with the baby are unelaborated. Finally, *distorted* representations are characterized by internal inconsistencies within the representation. Descriptions of the baby are often incoherent, confused, contradictory, or even bizarre. The expressed emotions about the baby generally lack contextual meaning (Benoit et al., 1997; Zeanah & Benoit, 1995). Disengaged as well as distorted representations can also be classified as *nonbalanced representations* (Zeanah, Benoit, Hirshberg, Barton, & Regan, 1994). As far as we know, studies concerning fathers' prenatal representations of their unborn children as measured with the WMCI have not yet been published (Vreeswijk, Maas, & Bakel, 2012).

Fathers' Experiences During Pregnancy

A limited number of studies have focused on different aspects of fathers' experiences of pregnancy and the fetus. Habib and Lancaster (2010), for example, found that feelings of prenatal attachment increase between the first and third trimester of pregnancy in first-time expectant fathers. This is in accordance with results found in mothers, who also report increases in feelings of attachment during the course of pregnancy (Van Bussel, Spitz, & Demyttenaere, 2010). Besides psychological changes, physiological and hormonal changes have been observed in men during and shortly after pregnancy. They generally experience significant changes in concentrations of prolactin, cortisol, and concentrations of testosterone pre- and postnatally, in line with patterns found in women (Alvergne, Faurie, & Raymond, 2009; Gettler, McDade, Feranil, & Kuzawa, 2011; Storey, Walsh, Quinton, & Wynne-Edwards, 2000). These results illustrate that not only women experience major changes during pregnancy, but that expectant fathers are also directly affected in their psychological and physical functioning.

Several studies have shown that maternal psychological wellbeing significantly relates to the quality of the mother-fetus attachment relationship. For example, mothers with higher levels of antenatal anxiety and depression, showed less optimal feelings of mother-fetal attachment (Hart & McMahon, 2006). When specifically considering internal representations, mothers with higher levels of depressive symptoms were more often found to have nonbalanced representations of their children (Korja et al., 2009; Minde, Tidmarsh, & Hughes, 2001; Rosenblum, McDonough, Muzik, Miller, & Sameroff, 2002; Wood, Hargreaves, & Marks, 2004). Also, mothers with symptoms of posttraumatic stress more often have distorted than disengaged representations (Armstrong & Hutti, 1998; Hart & McMahon, 2006; Schechter et al.,

2008; Schechter et al., 2005). Not only mothers, but also fathers may experience psychological distress when their partners are pregnant (Condon, Boyce, & Corkindale, 2004; Leathers & Kelley, 2000). Therefore, effects of symptoms of depression and anxiety on the father-fetus relationship will be considered in this study. It is expected that higher levels of depressive symptoms and anxiety of fathers will negatively influence the quality of their representations and prenatal attachment to the unborn baby.

The current study was conducted in the Netherlands and is among the first to systematically explore fathers' experiences of the unborn child during pregnancy. Because this is an exploratory study, a multidimensional approach was chosen to investigate the father-fetus relationship. The PAAS was used to measure levels of prenatal attachment, and the WMCI was administered to determine fathers' prenatal representations of their unborn babies. It is expected that fathers' self-reported feelings of prenatal attachment will be related to their prenatal representations of the fetus.

METHOD

Participants

The sample consisted of 301 expectant fathers. Fathers had a mean age of 34.01 years (*SD* = 4.59, range = 27.29-49.60) and were predominantly Dutch (80.4%); 64.2% of the fathers had a college degree, 96.6% were employed, and 54.7% of the fathers were expecting a first child. At 26 weeks gestational age, fathers completed several questionnaires. Fathers (*N* = 243) who gave consent to conduct a home visit also participated in a semistructured interview.

Measures

Internal Representations of the Unborn Baby

The WMCI (Zeanah et al., 1996) is a semistructured interview that focuses on the "meaning" that a child has to his or her parent or caregiver by asking the parent about his or her subjective experiences and perceptions of the child, parenting, and the relationship with the child. For the present study, the prenatal Dutch version of the WMCI was used. Fathers were asked questions concerning their experiences during their partner's pregnancy, their relationship with the unborn baby, and expectations they had for their child's future. The interviews were conducted during a home visit and lasted approximately 45 min. Each interview was videorecorded and coded afterward by two trained and reliable raters according to a specific coding scheme (Vreeswijk et al., 2012; Zeanah et al., 1994). The raters were first independently trained to rate the WMCI with official practice and reliability tapes. Then, to determine the interrater reliability, 59 interviews in our sample were double-coded. Significant interrater reliability of 80% was established (Cohen's $\kappa = .669$, $p < .001$). As described earlier, fathers' representations were classified into one of the three main categories of internal representations: balanced, disengaged, or distorted (Zeanah et al., 1994).

Father-Fetus Attachment

The PAAS (Condon, 1993) (Dutch translation by Colpin, De Munter, Nys, & Vandemeulebroecke, 1998) is a 16-item self-report questionnaire that was constructed to measure father-to-fetus attachment. It has adequate psychometric properties, with acceptable levels of split-half reliability and internal consistency ($\alpha > .80$). A total score of global father-to-fetus attachment can be calculated by adding up the scores of the individual items. Additionally, scores on the subscales quality of attachment (PAAS QA) and intensity of preoccupation (PAAS IP) can be calculated. An example item of PAAS QA is "When my baby is born I would like to hold the baby". An example item of PAAS IP is "Over the past 2 weeks I have had the desire to read about or get information about the developing baby". Higher scores on the PAAS represent stronger feelings of father-to-fetus attachment (Condon, 1993).

Fathers' Psychological Well-being

The presence of depressive symptoms was assessed using the Dutch version of the Edinburgh Depression Scale (EDS; Cox, Holden, & Sagovsky, 1987), a 10-item self-report questionnaire that was initially designed to screen for postnatal depression in women. The split-half reliability (.88) and internal reliability (α = .87) of the EDS are adequate (Cox et al., 1987). In the past decades, the EDS has also been used and proven effective in community samples of both men and women beyond the postnatal period (Cox, Chapman, Murray, & Jones, 1996; Ramchandani et al., 2005). Scores on the EDS can range from 0 to 30, and a score above 12 is indicative for the presence of a clinical depression (Cox et al., 1987). Symptoms of paternal anxiety were assessed using the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970), which consists of two subscales, each containing 20 items. The subscale *state anxiety* measures anxiety at the moment of completing the questionnaire, and *trait anxiety* measures dispositional anxiety or anxiety in general. Total scores of the state and trait subscales range from 20 to 80, and a higher score on the STAI represents more feelings of anxiety. The Dutch version of the STAI was found to have adequate psychometric properties (α = .95) (Van der Ploeg, 2000), and the state and trait subscales were found to correlate highly (.74) in a sample of pregnant women (Brouwers, van Baar, & Pop, 2001).

Procedure

The current study is part of the "Expectant Parents" study, a prospective longitudinal cohort study on prenatal risk factors and postnatal infant development (Maas, Vreeswijk, de Cock, Rijk, & van Bakel, 2012). Fathers were recruited through four midwifery practices at their partner's first or second visit to the practice. At 26 weeks gestational age, fathers completed questionnaires and were visited in their homes by a researcher to participate in a semistructured interview.

RESULTS

Descriptive Statistics

First, we examined the mean scores and distributions of the studied variables, which are reported in Table 1. As can be seen, the distribution of fathers' internal representations is 43.6% balanced, 49.0% disengaged, and 7.4% distorted. The distribution of internal representations found among community samples of expectant mothers is 62.0% balanced, 17.5% disengaged, and 20.5% distorted (Vreeswijk et al., 2012). Chi-square analyses showed that the distribution of fathers' prenatal representations significantly differs from the distribution in pregnant mothers ($X^2 = 171.09$, $df = 2$, $p < .001$). Mothers more often have balanced representations of their unborn children, whereas fathers more often have disengaged representations.

Table 1 *Mean scores and distributions of study variables*

	N	Mean *(SD)*	Range
Total prenatal attachment score	288	55.55 (5.97)	36 – 71
Prenatal quality of attachment	288	38.65 (3.41)	25 – 46
Prenatal intensity of preoccupation	289	16.89 (3.27)	9 – 26
Depressive symptoms	291	3.42 (3.43)	0 – 21
State anxiety	281	31.35 (7.66)	20 – 58
Trait anxiety	280	31.11 (6.89)	20 – 55
		Distribution	*N* (%)
WMCI classification	243	Balanced Disengaged Distorted	106 (43.6) 119 (49.0) 18 (7.4)

Note. WMCI = Working Model of the Child Interview

Paternal Antenatal Attachment

Second, we examined the relationship between paternal antenatal attachment (PAAS), paternal symptoms of depression and anxiety, and demographic characteristics. Pearson product-moment correlations between these variables are reported in Table 2. Fathers' quality of antenatal attachment was significantly and negatively related to depressive symptoms and state and trait anxiety. Younger fathers and fathers expecting their first child showed higher scores on quality of attachment to the unborn baby and intensity of preoccupation with the unborn baby. Furthermore, fathers' self-reported levels of depression and anxiety were strongly correlated (r = between .587 and .742). Finally, higher levels of education were associated with a lower intensity of preoccupation and less symptoms of depression and anxiety.

Table 2 *Pearson product-moment correlation matrix of independent variables*

	1	2	3	4	5	6	7	8	9
1. Total prenatal attachment score	1	.899**	.889**	-.061	-.107	-.153*	-.187**	-.351**	-.110
2. Prenatal quality of attachment		1	.598**	-.135*	-.169**	-.217**	-.122*	-.249**	-.043
3. Prenatal intensity of preoccupation			1	.029	-.018	-.048	-.212**	-.383**	-.158**
4. Depressive symptoms				1	.592**	.705**	-.002	.013	-.182**
5. State anxiety					1	.748**	.010	-.083	-.108
6. Trait anxiety						1	-.011	-.046	-.116
7. Father's age							1	.186**	.113
8. Parity[a]								1	.026
9. Father's education									1

[a]1 = first born; 2 = later born
*p<0.05, **p<0.01 (two-tailed)

Prenatal Internal Representations

In order to test the hypothesis that prenatal attachment and prenatal representations are related, a multinomial logistic regression analysis was performed. With a multinomial logistic regression model, the influence of several independent variables (i.e., psychological well-being, quality of antenatal attachment, intensity of preoccupation with the unborn baby, parity, age, and education) on a categorical dependent variable with more than two categories (i.e., WMCI categories balanced/disengaged/distorted) can be investigated. An overall score for *psychological well-being* of fathers was computed based on a confirmatory factor analysis of their EDS and STAI (sub)scale scores.

The model described above was found to be significant, $X^2(14, N = 216) = 52.67$, $p < .001$, which means that the set of independent variables significantly predicts the chance of having a specific WMCI classification. When considering the effects of each separate independent variable on the chance of having certain WMCI classifications, fathers' quality of prenatal attachment was found to make a significant individual contribution to the odds of fathers having balanced, disengaged, or distorted WMCI classifications, X^2 (2, $N = 216$) =11.07, $p = .004$. It was found that the odds of fathers having a balanced instead of a disengaged representation increase as fathers' scores on quality of attachment increase, $B = -.208$, $p = .002$. In other words, when fathers' scores on quality of attachment increase by one unit, the odds of having a balanced representation instead of a disengaged representation increase by 18.8%. Fathers' prenatal internal working models were not predicted by their psychological well-being, X^2 (2, $N = 216$) = 0.62, $p = .734$, intensity of preoccupation with the unborn baby, X^2 (2, $N = 216$) = 3.05, $p = .217$, parity, X^2 (2, $N = 216$) = 2.710, $p = .258$, age, X^2 (2, $N = 216$) = 3.21, $p = .201$, or education, X^2 (4, $N = 216$) = 4.69, $p = .321$.

DISCUSSION

The Prenatal Father-Infant Relationship: Contributions to Current Literature

In the present study, we examined paternal feelings of attachment toward the unborn baby in a community-based sample of Dutch expectant fathers. The study shows that the two theoretical concepts concerning the quality of fathers' prenatal attachment and their internal representations of the fetus appear to be related. Fathers who reported a higher quality of prenatal attachment were more likely to have balanced representations, whereas fathers with a lower quality of attachment were more likely to show disengaged representations.

Men's psychological well-being was negatively correlated with their self-reported quality of prenatal attachment. The relationships were modest, but significant, and are in accordance with results from previous research among expectant mothers by Hart and McMahon (2006). They found that self-reported symptoms of anxiety were related to the quality of maternal prenatal attachment, but not to the intensity of preoccupation. However, they did not find a significant relationship between symptoms of depression and prenatal attachment among mothers, even though the correlation coefficients they found between the same measures were larger than those found in our study (r = -.298 vs. r = -.170). The number of mothers included in their study (N = 53) was smaller than the number of fathers in our sample (N = 301), making it more difficult to achieve statistical significance.

Fathers' psychological well-being was not significantly related to their internal representations of the fetus, derived from the WMCI. The question that remains is why fathers' psychological well-being was not predictive of their WMCI classification, whereas it was related to their self-reported antenatal attachment. This may be due to an unequal distribution of fathers' internal representations (i.e., 43.6% balanced, 49.0% disengaged, and 7.4% distorted). Relatively few fathers were classified as distorted, whereas studies among mothers have shown that psychological difficulties often lead to more distorted rather than balanced or disengaged representations (Korja et al., 2009; Rosenblum et al., 2002; Schechter et al., 2005). In addition, prenatal attachment was measured using a self-report questionnaire that provides a continuous scale of scores of prenatal attachment, whereas the interview results in a forced classification into one of three main categories. Subtle increases in scores of psychological symptoms therefore may lead to effects in total scores on the prenatal attachment questionnaire, whereas they are not strong enough to establish significant differences in the distribution of WMCI classifications.

Parity, age, and education were also found significantly related to self-reported feelings of attachment but not to fathers' prenatal representations. Fathers expecting their first child reported a better quality of attachment toward the fetus and a higher intensity of preoccupation than fathers who had already experienced a pregnancy before. This may be due to the fact that the pregnancy is a new and overwhelming experience for first-time

expectant fathers. Fathers who already have a child generally have to divide their time and attention between their born child(ren) and the unborn child. This may affect their feelings of attachment and preoccupation. Younger fathers also report a better quality of attachment and higher intensity of preoccupation, but this effect can be explained by the fact that generally first-time fathers are also younger than fathers who already have children ($r = .202$). Fathers with higher educational backgrounds generally report a lower intensity of preoccupation with the fetus. This is partially in line with earlier research by Arnott and Meins (2008), where higher levels of paternal education were related to lower total PAAS scores. Their study, however, did not differentiate between the PAAS subscales, whereas in our study this differentiation revealed that educational background was only related to intensity of preoccupation with the fetus, not to the quality of prenatal attachment. Possibly, the effect of educational background can be explained by the fact that fathers with a higher level of education have more demanding jobs and therefore spend less time thinking about the unborn baby. This does not necessarily mean that they are less attached to the fetus.

The distribution of internal representations found among expectant fathers in this study significantly differs from what has been found among expectant mothers, that is, 62.0% balanced, 17.5% disengaged, and 20.5% distorted (Vreeswijk et al., 2012). Particularly the percentage of disengaged representations during pregnancy greatly differs between men and women. This suggests an emotional distance from the unborn baby in men compared with women. This may be a result of mothers physically carrying their unborn baby throughout the pregnancy and feeling the baby's physical presence throughout the day. The emotional distance was expressed in the interviews in several ways. The time length of interviews of fathers with disengaged representations was generally shorter, as they found it difficult to give detailed answers to the questions. Furthermore, the disengaged fathers were less able to describe their relationship with the unborn child in detail or could not give descriptions of the infant's personality. For example, in contrast to balanced fathers who gave specific and vivid examples of situations that occurred during the day, disengaged fathers were less able to do so. They used descriptions like "at the moment, it still feels unreal and far away." Because feelings of prenatal attachment have been found to increase between the first and third trimester of pregnancy (Habib & Lancaster, 2010; Van Bussel et al., 2010), the significant differences in distributions of maternal and paternal prenatal representations may also be (partly) explained by the time point at which the WMCI was conducted. In the current study, the WMCI was conducted at 26 weeks gestational age, whereas the abovementioned distribution scores of mothers were generally based on studies conducted in the third trimester of pregnancy (Benoit et al., 1997; Dayton et al., 2010; Huth-Bocks, Levendosky, Bogat, & Von Eye, 2004; Huth-Bocks, Levendosky, Theran, & Bogat, 2004; Theran et al., 2005).

Implications of the Results and Recommendations for Future Research

This study was meant as an exploratory and preliminary investigation of fathers' experiences during pregnancy. A limitation of this study is that it was conducted among a sample that mainly consisted of highly educated Dutch fathers. This limits the generalizability of the findings to less educated fathers and fathers of other nationalities. However, the fact that the distribution of WMCI classifications differs between community samples of mothers and fathers expecting a baby is a valuable finding. Clinicians need to be aware that mothers and fathers may differ in this respect, where disengaged representations presented by fathers during pregnancy may be less alarming than those presented by mothers. In this study, fathers' feelings of prenatal attachment and their representations were not compared directly with those of mothers. Especially because current literature on prenatal experiences of parents mostly focuses on maternal experiences, it would be of interest to compare the experiences of mothers and fathers during pregnancy concurrently, because it is an important time of transition. An ideal design for such comparisons would be a paired-samples design, including both parents of the unborn child. Different perceptions and experiences of women and men about the same pregnancy may then be attributed to parental characteristics. Also, this would provide an opportunity to directly investigate the influence of gender differences or masculinity constructs on parents' representations of their unborn baby. For example, it would be interesting to investigate different paternal roles in relation to representations fathers have of their unborn children, as they may differ in the extent to which they function as a protector, moral guide, teacher, or breadwinner in the family (Lamb & Tamis-Lemonda, 2004).

Because the implications of our results cannot be generalized to the postnatal period, it would be interesting to also investigate fathers' postnatal representations of their children and compare these distributions with those of mothers. In mothers, prenatal representations were found to be predictive of postnatal representations and interactions with the infant (Benoit et al., 1997; Dayton et al., 2010; Theran et al., 2005), but it is currently unknown if this is also the case among fathers. For example, it is not yet clear whether fathers with nonbalanced representations of the unborn child will also more often have nonbalanced representations once the child is born. Given the differences in the distribution of the prenatal classifications of fathers and mothers, and the psychological process fathers go through during pregnancy (Genesoni & Tallandini, 2009), a shift toward balanced representations after birth may be more prevalent for fathers. To increase generalizability of studies suggested above, it would be important to also study these phenomena among parents varying in educational backgrounds and of different nationalities.

Fathers' representations of the fetus were closely related to their reported quality of prenatal attachment, but not to the intensity of preoccupation they show toward the fetus. This finding shows that the *quality* of fathers' thoughts and feelings of the unborn baby is more important in shaping their representations of the fetus than the actual amount of time

spent on thinking about the unborn child. In other words, it is important for clinicians to specifically focus on the content of the thoughts fathers have of the baby when evaluating the relationship fathers have with their unborn children. Fathers who reported more symptoms of depression or anxiety generally had a poorer quality of attachment toward their fetus. Postnatal depression among fathers is known to have negative influences on the partner relationship of parents, child development and behavior, and the quality of parenting behavior (Fletcher et al., 2011; Ramchandani et al., 2011; Wilson & Durbin, 2010). The results of this study stress the importance of also considering the psychological well-being of fathers during prenatal health care.

Because this study does not illustrate whether a poorer quality of prenatal attachment is predictive of the quality of the postnatal father-infant relationship or future child development, it would be interesting to longitudinally investigate the stability of fathers' feelings of prenatal and postnatal attachment and their representations of the child. If fathers' prenatal representations and attachment are indeed predictive of their postnatal representations and attachment toward the infant, prenatal screening for problematic representations and attachment relationships may be considered in order to screen for and possibly prevent problems in this area.

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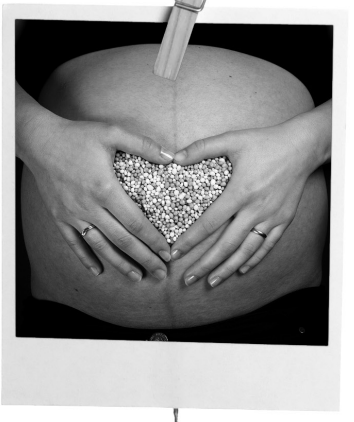

5

Stability of fathers' representations of their infants during the transition to parenthood

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Under review

ABSTRACT

Background: Studies investigating fathers' roles in child development have focused on a range of different aspects. However, few studies have focused on the *early* father-infant relationship, which already emerges before the child is born.
Aim of this study is to examine the concordance of fathers' representations of their children during the transition to parenthood. The influences of demographic variables, psychological wellbeing, attachment style, and personality on the stability of these representations are investigated.

Method: At 26 weeks gestational age and when infants were six months old, fathers (*N*=243) completed questionnaires and the Working Model of the Child Interview during a home visit.

Results: A strong association was found between fathers' prenatal and postnatal representations. First-time fathers more often had balanced representations than fathers who already had children. Furthermore, more agreeable and less profoundly distrustful fathers were more likely to evolve from a non-balanced prenatal representation to a balanced postnatal representation.

Discussion: Even though fathers have less opportunity for interacting with their unborn baby during pregnancy than mothers, fathers' representations of their infants evolve during pregnancy and are related to their postnatal representations.

BACKGROUND

In the past decades, research has come to show that fathers' involvement with regard to child rearing practices has become more and more important. Moreover, research on fathering and father-child relationships has become more prevalent (Grossmann, Grossmann, Fremmer-Bombik, Kindler, & Scheuerer-Englisch, 2002; Lamb, Hwang, Frodi, & Frodi, 1982; Williams & Kelly, 2005). When interacting or playing with their children, fathers seem to fulfill a different role than mothers do (Paquette, 2004). Fathers generally prefer exciting activities and more often develop arousing and playful relationships with their children, while mothers generally prefer more quiet activities. Infants also tend to respond to fathers with more excitement than they do to their mothers. Mothers and fathers seem to interact with their children in complementary ways, and it is therefore essential that research also focuses on the father-child relationship.

Studies investigating the role of the father in child development have focused on a range of different aspects of fathers and the father-child relationship, such as paternal emotional wellbeing, father-child attachment, and the quality of father-child interactive behavior (Grossmann et al., 2002; Hjelmstedt & Collins, 2008; Lundy, 2002; Paquette, 2004; Ramchandani, Stein, Evans, & O'Connor, 2005; Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008; Schoppe-Sullivan et al., 2006; Trautmann-Villalba, Gschwendt, Schmidt, & Laucht, 2006; Van IJzendoorn & De Wolff, 1997). Overall, these studies have shown that fathers' active and regular engagement with their children has positive effects on children's social, behavioral, psychological, and cognitive development later in life (Sarkadi, Kistionsson, Oberklaid, & Bremberg, 2008). Specific factors that are related to optimal later child development are lower levels of fathers' depressive symptoms, better quality of play sensitivity, and more paternal responsiveness (Ramchandani ea., 2005; Grossman ea., 2002; Trautmann-Villalba ea., 2006).

Thus far, relatively few studies have focused on the *early* father-infant relationship, which already emerges before the child is born (Brandon, Pitts, Denton, Stringer, & Evans, 2009; Raphael-Leff, 2005; Vreeswijk, Maas, Rijk, & Van Bakel, 2013). During pregnancy, parents psychologically prepare themselves for life with their child. In this process, they generally develop expectations of the future and start to create internal representations of the unborn baby (Benoit, Parker, & Zeanah, 1997; Theran, Levendosky, Bogat, & Huth-Bocks, 2005; Zeanah, Keener, & Anders, 1986). Although this period is an important time of transition for fathers-to-be, studies concerning parents' relationships with the unborn baby and young infant have mainly focused on experiences of mothers (Ramchandani et al., 2013).

In an earlier study, we focused on fathers' experiences during pregnancy by investigating the representations they had of their unborn child and their self-reported prenatal attachment (*Chapter 4*). This study showed that these two concepts are related to each other, where fathers reporting a higher quality of attachment toward the fetus more often have a balanced representation of the unborn baby. Since the quality of the father-infant relationship has important developmental consequences for children later in life, the aim of the current

study is to examine whether fathers' representations of their child remain stable over time during the transition from pregnancy to six months after birth. If fathers' representations are found to be stable, possibly fathers at risk for developing a sub-optimal representation of their infants can already be identified during pregnancy. Additionally, factors related to the stability or change of these representations are investigated.

Internal Representations

Internal *representations* are comprised of a set of tendencies to behave in particular ways in intimate relationships and have also been described as internal working models (Zeanah & Smyke, 2009). Representations that fathers develop of their children can be seen as fathers' internal subjective experiences of the relationships with their children (Zeanah & Benoit, 1995). They can be assessed by studying fathers' subjective narrative patterns when they describe relationship experiences with their infants (Zeanah, 2000). These representations provide information about the 'meaning' a child has to his or her father and they do not emerge once a child is born, but already start to evolve during pregnancy.

Generally, it has been shown that the quality of the (prenatal) father-infant relationship may be shaped by personality traits, depression, anxiety, partner relationship, attachment style, and several demographic variables (Bouchard, 2011; Hjelmstedt & Collins, 2008; Kochanska, Friesenborg, Lange, & Martel, 2004; Lundy, 2002; Schoppe-Sullivan et al., 2006; Thompson, 2008; Vreeswijk et al., 2013). However, factors that are specifically related to the representations that fathers have of their (unborn) children, have not been yet been identified. When considering studies among mothers, prenatal representations were found to be associated with mothers' own attachment experiences and postnatal representations were related to their psychological wellbeing and personality (Ammaniti, Tambelli, & Odorisio, 2012; Vreeswijk, Maas, & Bakel, 2012).

One of the few instruments to study parents' prenatal and postnatal representations of the infant, is the Working Model of the Child Interview (WMCI) (Zeanah, Benoit, Barton, & Hirshberg, 1996). This interview was designed in the mid 1980's because earlier studies showed that parents' perceptions of their infants are not objective, but are 'colored' by the parents' own characteristics and by the expectations parents have of their children before they are born. During the WMCI, parents are asked about their subjective experiences and perceptions of the child, parenting, and the relationship with the child. Parents' thoughts and feelings about their infants in specific situations are elicited with questions concerning their perceptions of the infant's personality characteristics and behavior. The interview focuses on the current situation as well as on past experiences with the child and expectations parents have for the future (Benoit et al., 1997; Zeanah, Benoit, Hirshberg, Barton, & Regan, 1994).

With the WMCI, parental representations can be classified as either *balanced* or *non-balanced* (Zeanah et al., 1994). In order to classify a parent's representation, a trained coder has to read a transcript of the interview or listen to a recording of the interview and work through a specific coding scheme. When a parent has a balanced representation of the infant, (s)he

seems to be engrossed in the relationship with the baby, appreciates the baby's subjective experiences, and values the relationship with the baby and the baby's individuality. Balanced representations are open to change as new information about the baby becomes available. Non-balanced representations either have a disengaged or a distorted character. Parents with disengaged representations portray a sense of coolness, indifference or emotional distance from the baby and distorted representations are characterized by internal inconsistencies within the representation (Benoit et al., 1997; Zeanah & Benoit, 1995).

Stability and Change of Internal Representations

In mothers, the quality of the prenatal and postnatal parent-infant relationship were found to be related to each other (Benoit et al., 1997; Müller, 1996; Siddiqui & Hägglöf, 2000; Stern, 1995; Theran et al., 2005). More specifically, mothers' prenatal representations were found related to infant attachment, the quality of postnatal mother-infant interactions, and to mothers' postnatal representations of their infants (Benoit et al., 1997; Dayton, Levendosky, Davidson, & Bogat, 2010; Theran et al., 2005). Overall, studies showed substantial concordance between the WMCI and the traditional classification of infant attachment. Children of mothers with balanced representations more often showed secure attachment behavior, whereas children of mothers with disengaged representations more often showed avoidant attachment, and children of mothers with distorted representations more often showed resistant/ambivalent attachment (Benoit et al., 1997; Zeanah et al., 1994). Furthermore, the WMCI classifications have been associated with differences in parenting behavior, where mothers with disengaged representations more often showed less sensitivity, encouragement, and guidance (Sokolowski, Hans, Bernstein, & Cox, 2007) and mothers with distorted representations more often showed atypical behavior during mother-infant interactions (Schechter et al., 2008).

Two studies have investigated the stability of mothers' representations from the prenatal period to the postnatal period (Benoit et al., 1997; Theran et al., 2005). Both studies concluded that there was a significant stability of mothers' classifications as assessed with the WMCI across this time of transition (62-74%). This stability across time was highest for mothers with balanced representations of their unborn child. Theran et al. (2005) also investigated whether specific characteristics could be identified that are related to the stability or change of maternal representations from pregnancy to the postnatal period. They found that mothers whose representations shifted from balanced to non-balanced were more likely to have lower incomes, to be single parents, and to have experienced physical abuse during pregnancy than mothers whose representations remained balanced over time. Mothers whose representations shifted from non-balanced to balanced during the course of time had fewer depressive symptoms during pregnancy, were more likely to have higher incomes, and were more likely to be with the same partner at both time points than mothers whose representations remained non-balanced. Until now, the relationship between pre- and postnatal representations fathers have of their (unborn) babies has not been investigated.

Rationale and Hypotheses

As mentioned before, prenatal representations fathers form with their unborn babies have hardly been studied. We investigated the distribution of prenatal representations among fathers in an earlier study (*Chapter 4*), and compared these results to what has been reported about maternal prenatal representations in other studies (Vreeswijk et al., 2012). Fathers more often had disengaged representations of their unborn infants, while mothers' representations were more often balanced. The fact that the distributions of mothers' and fathers' prenatal representations showed distinct differences raises the question whether their transition to parenthood will also be different. The first question to be addressed is whether fathers' prenatal representations remain stable from pregnancy into the postnatal period. The second question is whether factors can be identified that are related to the stability or change of paternal representations from the prenatal to postnatal period.

Research among mothers suggests that WMCI distributions and changes between pre- and postnatal representations of infants are associated with maternal demographic, psychological, and personality characteristics (Theran et al., 2005). It is hypothesized that fathers with balanced prenatal representations will more often have a balanced representation six months postpartum than fathers with non-balanced prenatal representations. Additionally, it is expected that fathers with fewer symptoms of depression and anxiety, who have a more secure personal attachment style and who are more emotionally stable will more often have a balanced postnatal representation.

METHOD

Participants and Procedure

The current study is part of the "Expectant Parents" project, a prospective longitudinal cohort study on prenatal risk factors and postnatal infant development. More details about recruitment of the participants and the data collection used in this study have been reported in *Chapter 2*. The sample consisted of 243 expectant fathers with a mean age of 34.11 years (SD=4.55, range=22.31-49.60). Fathers were predominantly Dutch (80.2%) and their years of education following primary school varied from 0-4 years (10.7%), 5-8 years (21.8%), to 9 years or more (65.4%). 96.3% of the fathers were employed and 53.9% were expecting a first child. 127 (52.3%) of the infants were boys and 116 (47.7%) were girls.

At 26 weeks gestational age, fathers completed questionnaires and participated in a semi-structured interview during a home visit (prenatal version of the WMCI). When infants were six months old, fathers again participated in a semi-structured interview (postnatal version of the WMCI). During the time course of the study, some fathers (7.4%) were lost to follow-up due to various reasons. In total, 225 fathers participated in both home visits and the questionnaires were completed by 217 fathers (96.4%).

Measures

Representations of the (Unborn) Baby

The Working Model of the Child Interview (WMCI) (Zeanah et al., 1996) is a semi-structured interview that focuses on the 'meaning' a child has to his or her parent. Fathers were asked questions concerning their experiences with the (unborn) child, their relationship with the (unborn) baby, and expectations they had for their child's future. The interviews were conducted during home visits and lasted approximately 45 minutes. Each interview was video-recorded and coded afterwards by two trained and reliable coders according to a specific coding scheme (Zeanah et al., 1994). Fifty-nine interviews were double coded, and an inter-rater reliability of 80% was established (Cohen's kappa=.669, p=.000). As described earlier, fathers' representations were classified as either balanced or non-balanced (i.e. disengaged or distorted) representations (Zeanah et al., 1994).

Psychological Wellbeing

The presence of depressive symptoms was assessed using the Edinburgh Depression Scale (EDS) (Cox, Holden, & Sagovsky, 1987), a valid and reliable 10-item self-report questionnaire. The EDS has been used and proven effective in community samples of men and women beyond the pre- and postnatal period (Cox, Chapman, Murray, & Jones, 1996; Matthey, Barnett, Kavanagh, & Howie, 2001). Symptoms of anxiety were assessed using the State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1970), which consists of two subscales containing 20 items. The subscale *state anxiety* measures anxiety at the moment

of completing the questionnaire, while *trait anxiety* measures dispositional anxiety or anxiety in general. The Dutch version of the STAI was found to be reliable and valid (Van der Ploeg, 2000). An overall score for *psychological wellbeing* of fathers was computed based upon a Confirmatory Factor Analysis of their EDS and STAI (sub)scale scores at 26 weeks gestational age.

Attachment Style

To investigate attachment style, the Relationship Questionnaire-clinical version (RQ-CV) (Bartholomew & Horowitz, 1991; Holmes & Lyons-Ruth, 2006) was used at 26 weeks gestational age. The questionnaire consists of five statements, which describe different ways to interact or relate to other people. Each statement represents a different attachment style, i.e. (1) secure, (2) fearful-avoidant, (3) preoccupied (anxious-ambivalent), (4) dismissing-avoidant and (5) profoundly distrustful. An example of a statement used in this questionnaire is: "It is relatively easy for me to become emotionally close to others. I am comfortable depending on others and having others depend on me. I don't worry about being alone or having others not accept me". Fathers had to indicate to which degree they (dis)agree with each statement on a 7-point Likert scale. This procedure allows for a dimensional analysis of attachment style, instead of a categorical classification of fathers into one of several attachment patterns. A higher score on each Likert scale reflects that the father identifies more with the corresponding attachment style. The RQ has acceptable validity and reliability (Griffin & Bartholomew, 1994; Scharfe & Bartholomew, 1994) and was found to correlate with several personality factors but was not identical to them (Bäckström & Holmes, 2001) The attachment style (5) profoundly distrustful was added in the clinical version of the RQ.

Personality Characteristics

At 26 weeks gestational age, fathers also completed the Quick Big Five inventory (QBF) (Vermulst & Gerris, 2005). The following personality dimensions were investigated: Extraversion, conscientiousness, agreeableness, emotional stability, and openness. Each dimension was represented by six items. Each item consisted of one adjective, and fathers had to report to which degree each adjective represents him as a person on a 7-point Likert scale. Examples of adjectives are: "Careful", "nervous", and "creative". In earlier research, the internal consistency of the five personality dimensions was high, the test-retest reliability was acceptable, and the validity of the inventory was good (Vermulst & Gerris, 2005).

Statistical Analyses

All statistical analyses were performed using SPSS 19.0 for Windows. First, several descriptive analyses were performed with the distributions of fathers' pre- and postnatal representations on the WMCI. Cohen's kappa was calculated between fathers' pre- and postnatal representations to examine the stability or change of the WMCI classifications.

To examine factors that may be related to fathers' representations of their infant during pregnancy, we conducted a logistic regression analysis predicting the prenatal WMCI classification (balanced/non-balanced) based upon four blocks of predictors that were added in a hierarchical fashion to the regression model. The first predictor block contains the background variables income and parity, the second block consists of psychological well-being, the third block represents attachment style as measured by the RQ-CV, and finally the forth block represents personality as measured by the QBF. Adding the predictor variables in these blocks enables interpretation of the effects of attachment style and personality as constructs as well as interpretation of the individual subscales that these constructs are based on.

To examine factors that are associated with fathers' representations of their infant after birth, a similar hierarchical logistic regression procedure was followed to predict the postnatal WMCI classification, but now conditionally upon the earlier prenatal WMCI classification of the father. When the focus is on the dynamic part of the data, i.e., the transition patterns from balanced to non-balanced/balanced (and vice versa), adding the prenatal WMCI as predictor to the model for the postnatal WMCI, offers a clean and simple approach to study these dynamics in terms of conditional probabilities (Yang, Shoptaw, Nie, Liu, & Belin, 2007; Yu, Morgenstern, Hurwitz, & Berlin, 2003)[1]. Multiple imputation based upon a regression-based Bayesian augmentation algorithm was used to take into account missing data uncertainty (see e.g. Rubin, 1987; Sinharay, Stern, & Russell, 2001). Results were pooled across 50 datasets.

1 Formally this sequence of simple logistic regression models can be considered a so-called Markov transition model which is based upon the following probability relation: $Pr(postnatal) = Pr(postnatal \mid prenatal)Pr(prenatal)$.

RESULTS

Descriptive Analyses

Slightly less than half of the fathers had a balanced representation of their infant during pregnancy (45.3% balanced versus 54.7% non-balanced). Of those with a balanced prenatal representation, 82.4% retained a balanced representation postnatally. In contrast, of those with a non-balanced prenatal representation, 49.59% retained their non-balanced representation. The other half shifted to a balanced postnatal representation. Hence, a transition or shift in representation is more likely for fathers with a prenatal non-balanced representation, whereas fathers with a prenatal balanced representation are more likely to show stability. Six months after the child is born, this results in 64.4 % of the fathers having a balanced representation versus 35.6% with a non-balanced representation. Table 1 provides the corresponding cross-classification of pre- and postnatal WMCI representations for the 225 fathers that participated in both home visits. Table 2 provides Pearson product-moment correlations between all studied variables, showing that fathers' prenatal and postnatal representations are also significantly correlated (r=.341, p=.000). Additionally, several subscales concerning fathers' relationship style and personality were significantly correlated to each other. For example, fathers' scores on the dismissing-avoidant and profoundly distrustful subscales of the RQ and fathers' scores on the extraversion and agreeableness subscale of the QBF are positively correlated to each other (r=.43, p=.000 and r=.363, p=.000 respectively).

Table 1 *Distribution of fathers' pre- and postnatal representations on the WMCI*[a]

		Postnatal representations			
		Balanced	Disengaged	Distorted	Total
Prenatal representations	Balanced	84	9	9	102
	Disengaged	56	41	10	107
	Distorted	5	4	7	16
	Total	145	54	26	225

58.67% agreement, kappa=.294 (p<.001)

[a] When collapsed into a balanced/non-balanced dichotomy, there was 64.89% agreement and kappa=.316 (p<.001)

Table 2 *Pearson product moment correlations among the study measures*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. PreWMCI [a]	1													
2. PostWMCI[a]	.341 ***	1												
3. Parity[b]	-.211 ***	-.231 ***	1											
4. Ps.wellbeing[c]	-.035	-.093	-.036	1										
5. RQ1[d]	.031	.156 *	.130 *	-.292 ***	1									
6. RQ2[e]	-.099	-.130	.085	.282 ***	-.294 ***	1								
7. RQ3[f]	.002	-.135 *	-.022	.282 ***	-.138 *	.045	1							
8. RQ4[g]	.007	-.078	-.021	.044	-.176 **	.209 ***	-.074	1						
9. RQ5[h]	-.067	-.297 ***	-.010	.257 ***	-.212 ***	.360 ***	.118	.430 ***	1					
10. QBF1[i]	.107	.078	-.013	-.300 ***	.346 ***	.428 ***	-.090	-.149 *	-.092	1				
11. QBF 2[j]	.128	.071	-.081	-.164 ***	-.039	.014	-.154 **	.146 *	.035	.015	1			
12. QBF 3[k]	.143	.345 ***	-.033	-.332 ***	.311 ***	-.201 ***	-.168 **	-.069	-.200 ***	.363 ***	.120 *	1		
13. QBF 4[l]	-.014	.114	.050	-.014	.302 ***	-.271 ***	-.238 ***	.005	-.213 ***	.354 ***	.157 **	.416 ***	1	
14. QBF 5[m]	.158	.163 *	-.029	.158 *	.156 **	-.125 *	-.060	-.064	-.067	.262 ***	.054	.285 ***	.120 *	1

Note: ***p≤.001, **p≤0.01, *p≤0.05; [a]0=Non-balanced, 1=Balanced; [b]0=first born, 1=later born; [c]A higher score indicates more symptoms of depression and anxiety are present; [d]RQ: secure; [e]RQ: Fearful-avoidant; [f]RQ: Preoccupied; [g]RQ: Dismissing-avoidant; [h]RQ: Profoundly distrustful; [i]QBF: Extraversion; [j]QBF: Conscientiousness; [k]QBF: Agreeableness; [l]QBF: Emotional stability; [m]QBF: Resourcefulness

Prenatal Representations

Based on our total study sample (*N* = 243), the overall chance of fathers having a balanced prenatal representation is 43.6%. Table 3 summarizes the results of the hierarchical logistic regression that was used to estimate the added unique contribution of background variables, psychological wellbeing, attachment style, and personality characteristics on the prediction of fathers' prenatal representations. Of the background variables in Block 1, only parity had a significant negative effect. The odds of having a balanced representation instead of a non-balanced representation on the prenatal version of the WMCI are lower for fathers who are not expecting their first child (OR = 0.43, 95% CI [0.25-0.74]). When fixing all other predictors at their sample average in the model, a 52.6% chance of having a balanced prenatal representation is predicted for fathers expecting a first child, whereas this chance is only 32.4% for fathers who already have children. No significant contributions of psychological wellbeing (Block 2) and attachment style (Block 3) were found. The addition of personality (Block 4) was significant, indicating a unique contribution of personality as a construct to the prediction of a balanced representation on top of the background variables, psychological wellbeing, and attachment style. Interpretation of the individual effects of the personality traits is less straightforward since none of the effects of the subscales reached significance at a 5% level. However, there is a trend showing that more conscientious fathers have a higher chance of having a balanced prenatal representation (OR = 1.27, 95% CI [1.00-1.62]). Another trend shows that fathers who are more profoundly distrustful have a lower chance of having a balanced prenatal representation (OR = 0.80, 95% CI [0.62-1.05]).

Table 3 *Results of hierarchical logistic regression analysis: Prenatal WMCI*

Prenatal WMCI[a]						
	Added variable	Chi^2	p-value	Predictor	β^c *(SE)*	p-value
Block 1	Background variables	14.85	.001***			
Block 2	Psychological well-being	1.44	.230			
Block 3	Attachment style	2.54	.771			
Block 4	Personality	17.96	.003**	Intercept	-2.18 (2.37)	.359
				Parity	-.84 (.29)	.003**
				Income	-.29 (.25)	.243
				Psychological wellbeing	.12 (.21)	.565
				RQ: Secure	-.01 (.12)	.931
				RQ: Fearful-avoidant	-.11 (.14)	.454
				RQ: Preoccupied	.06 (.13)	.670
				RQ: Dismissing-avoidant	.11 (.11)	.313
				RQ: Profoundly distrustful	-.22 (.13)	.096
				QBF: Extraversion	.18 (.16)	.245
				QBF: Conscientiousness	.24 (.13)	.055
				QBF: Agreeableness	.40 (.25)	.111
				QBF: Emotional stability	-.32 (.23)	.164
				QBF: Resourcefulness	.20 (.17)	.220

Note: ***p≤.001, **p≤0.01, *p≤0.05 (two-tailed); [a]0=Non-balanced, 1=Balanced; [b]0=first born, 1=later born; [c]OR = e^{β}; RQ = Relationship Questionnaire; QBF = Quick Big Five.

Transition from Prenatal to Postnatal Representations

As mentioned before, fathers generally more often have balanced representations of their infants postpartum (64.4%) than during pregnancy (45.3%). Table 4 summarizes the results of the hierarchical logistic regression that was used to estimate the predictive effect of fathers' prenatal representations on their postnatal representations, and potential determinants that can add to this prediction. First, fathers' prenatal representations were added to the model in Block 1. Then the same blocks of predictors were used as for the previous regression analysis regarding prenatal representations.

Table 4 Results of hierarchical logistic regression analysis: Transition from prenatal to postnatal representations

Postnatal WMCI[a]						
	Added variable	Chi^2	p-value	Predictor	β^c *(SE)*	p-value
Block 1	Prenatal WMCI	17.47	.000***			
Block 2	Background variables	10.86	.004**			
Block 3	Psychological well-being	1.93	.164			
Block 4	Attachment style	10.11	.072			
Block 5	Personality	18.06	.003**	Intercept	-4.69 (2.95)	.112
				Prenatal WMCI	1.32 (.37)	.000***
				Parity[b]	-1.02 (.35)	.004**
				Income	.07 (.33)	.832
				Psychological wellbeing	.04 (.26)	.865
				RQ: Secure	.14 (15)	.352
				RQ: Fearful-avoidant	.04 (.17)	.837
				RQ: Preoccupied	-.19 (.16)	.224
				RQ: Dismissing-avoidant	.09 (.13)	.493
				RQ: Profoundly distrustful	-.39 (.17)	.020*
				QBF: Extraversion	-.12 (.19)	.523
				QBF: Conscientiousness	.06 (.15)	.707
				QBF: Agreeableness	1.12 (.33)	.001***
				QBF: Emotional stability	-.18 (.29)	.548
				QBF: Resourcefulness	.04 (.20)	.825

Note: ***p≤.001, **p≤0.01, *p≤0.05 (two-tailed); [a]0=Non-balanced, 1=Balanced; [b]0=first born, 1=later born; [c]OR = e^{β}; RQ = Relationship Questionnaire; QBF = Quick Big Five.

The strong and significant effect of Block 1 of this model confirms that fathers' representations of their infants show stability from the prenatal to the postnatal period. The odds of having a balanced representation instead of a non-balanced representation on the postnatal version of the WMCI are much higher for fathers who already had a balanced representation prenatally (OR=3.74 CI [1.81-7.72]). When setting all other predictor variables at their sample average, an average first-time father with a balanced prenatal representation is expected to have an 88.2% chance of also having a balanced postnatal representation, while this is 66.6% for average first-time fathers who have a non-balanced prenatal representation.

Adding background variables (Block 2) to this regression model had a significant effect, where parity was found to have an additional significant influence on fathers' postnatal representations. The odds of having a balanced representation on the postnatal version of the WMCI decreased for fathers who are not expecting their first child (OR=0.36, CI [0.18-0.72]). When keeping all other predictor variables constant, fathers with a balanced representation prenatally and expecting a first child have an 88.2% chance of having a balanced representation after birth, while this chance is 72.9% for fathers who already have children.

Adding the constructs psychological wellbeing (Block 3) and attachment style (Block 4) to the model, did not result in a significant improvement of the model fit to predict fathers' postnatal representations. However, when adding fathers' personality characteristics to the model in Block 5, a significant fit of the total model (including all independent variables) was found. In this final model, agreeableness and a profoundly distrustful attachment style show an additional main effect. The odds of having a balanced representation increase when fathers are more agreeable (OR=3.06, CI [1.62-5.81]), and when they are less profoundly distrustful (RQ subscale '5') (OR=0.68, CI [0.49-0.94]).

To illustrate the potential impact of the independent variables, the following two examples represent the most extreme 'types' of fathers in our sample.

a) When a father has a balanced representation during pregnancy, the chance that his postnatal representation will be balanced is 83.1%, if he is expecting his first child, is very agreeable and also not profoundly distrustful. However, if this type of father (with a balanced prenatal representation) already has children, is not very agreeable and is profoundly distrustful, he only has a 17.5% chance of having a balanced postnatal representation.
b) When a father has a non-balanced prenatal representation, the chance that his postnatal representation will shift towards a balanced representation is 56.8%, if he is expecting his first child, is very agreeable and not profoundly distrustful. However, if this father (with a non-balanced prenatal representation) already has children, is not agreeable and is profoundly distrustful, he only has a 5.4% chance of shifting towards a balanced postnatal representation.

DISCUSSION

This study is among the first to examine the concordance between representations that fathers have about their infant during pregnancy and after birth. The findings of this study show a strong association between fathers' prenatal representations and the postnatal representations they have of their children. The results are in line with research that was conducted with the WMCI among mothers (Benoit et al., 1997; Theran et al., 2005) and with studies concerning prenatal and postnatal parent-infant attachment (Müller, 1996; Siddiqui & Hägglöf, 2000). The concordance between fathers' pre- and postnatal representations remains strong when taking into account parity, psychological wellbeing, attachment style, and personality characteristics. This suggests that the mental representations that fathers have of their unborn infants have a unique contribution to the chance of having a balanced representation of their children postpartum. Especially fathers' balanced prenatal representations are stable across this time of transition to parenthood. These findings highlight that, even though fathers do not physically carry the child during pregnancy and they have less opportunities for interacting with their unborn baby than mothers, the father-infant relationship already exists prior to the birth of the child. In shaping the postnatal representation, it may be very important that fathers already create a balanced mental representation during pregnancy. Studies among mothers have stressed the importance of having balanced (prenatal) representations, because these are related to secure infant attachment (Benoit et al., 1997; Zeanah et al., 1994), positive parenting behavior (Dayton et al., 2010), and higher quality of mother-infant interactive behavior (Korja et al., 2010). However, this study is the first to investigate fathers' prenatal and postnatal representations of their children, and implications of these constructs on later child development and father-infant attachment have not yet been investigated.

The present study also showed that parity was associated with the quality of fathers' representations, both in the prenatal and postnatal period. First-time fathers were more likely to have balanced representations in contrast to fathers already having one or more children. Studies conducted with the WMCI thus far have not investigated the association between parity and parents' representations, but these findings are in line with reports of first-time parents reporting higher levels of prenatal attachment than parents who already have children (Cannella, 2005; Nichols, Roux, & Harris, 2007). The transition to parenthood seems to be different for first-time fathers and fathers who have already been through this process before. Fathers who have already experienced what it is like to become a father, may be less involved in their partner's pregnancy and be more disengaged from this process, resulting in a non-balanced mental representation. Furthermore, these fathers will generally have to divide their attention between their children, which may interfere with establishing a balanced representation of the unborn child prenatally and of the young infant postnatally.

Despite the strong association found between pre- and postnatal representations, fathers' representations were also found to be open to change, where non-balanced representations

were found to be less stable from the prenatal to the postnatal period than balanced representations. This may be related to the fact that fathers' feelings of affection toward the unborn baby grow during the course of pregnancy (Bussel, Spitz, & Demyttenaere, 2010; Slade, Cohen, Sadler, & Miller, 2009). Also, once the child is born, fathers have more opportunities to actively interact with the infant. Fathers with prenatal disengaged representations often find it difficult to describe their unborn infant and they do not feel they actually have a relationship with the fetus. Once the child is born they can more directly work on building a relationship with the infant through interactions, which may then lead to more balanced postnatal representations.

For clinical practice, it is especially interesting to know which factors are related to a positive change in fathers' representations. In addition to the association between prenatal representations and parity and fathers' postnatal representations, we found that fathers who are more agreeable and less profoundly distrustful are more likely to evolve from a non-balanced prenatal representation to a balanced postnatal representation. This is in line with findings of Sokolowski et al. (2007), who showed that mothers who report more hostility are more likely to have non-balanced representations. Fathers who are more profoundly distrustful believe that other people are generally not trustworthy and will behave more hostile towards other people. Fathers with this attitude towards relationships more often have persistent non-balanced representations of their children. It may be possible that they prefer to keep other people at a distance and do not engage in many close relationships with other people. This may make it extremely difficult for them to create a balanced mental representation of their own child. Additional analyses (not reported) showed that only a minority of fathers with balanced pre- and postnatal representations reported high scores on the profoundly distrustful attachment style (4.3% and 9.9% respectively).

Furthermore, we found that a secure attachment style was not associated with fathers' representations of their (unborn) infants. Fathers with a secure attachment style generally do not experience many difficulties in becoming emotionally close to others and we expected that this would enable fathers scoring high on the secure attachment subscale to develop balanced representations of their infants. Probably, the lack of association between own attachment style and representations about the infant may be explained by the differences in measurement methods. The RQ was used to measure attachment style, which is a self-report measure. On the other hand, the WMCI is an observational method based on a semi-structured interview used to derive people's representations of their infants. The structure and coding of the WMCI are close to those of the Adult Attachment Interview (AAI: Main, Kaplan, & Cassidy, 1985), which focuses on representations people form of themselves and others based on their own childhood experiences (Steele, Steele, & Murphy, 2009). A meta-analysis by Roisman et al. (2007) showed that self-report measures of attachment relationships and the AAI only show trivial empirical overlap. This discrepancy due to the nature of the study measures may also have affected the results of the current study.

Remarkably, fathers' psychological wellbeing, including symptoms of depression and anxiety, was also not associated with the quality of their prenatal or postnatal representations. This is in contrast to what has been found in studies with the WMCI among mothers, where higher levels of depressive symptoms and symptoms of posttraumatic stress were related to non-balanced representations (Korja et al., 2009; Rosenblum, McDonough, Muzik, Miller, & Sameroff, 2002; Schechter et al., 2008; Schechter et al., 2005; Wood, Hargreaves, & Marks, 2004). However, the discrepancy between those studies and the present study may be explained by the fact that these previous studies were mostly conducted among high-risk samples. Our study was conducted among a low risk, community sample where fathers reported few symptoms of anxiety and depression. Also, in our study, most fathers with non-balanced representations had a disengaged representation, while the previous studies generally found that mothers with distorted representations had more symptoms of depression and anxiety.

Our results further show that fathers' personality constructs in general were significantly associated with their prenatal representations. However, the individual personality subscale(s) did not reach statistical significance. There was a trend showing that fathers who are more conscientious more often have a balanced prenatal representation than fathers who score low on this trait. Possibly, conscientious fathers are more likely to closely follow their partner's pregnancy and the development of the unborn baby than fathers who are less conscientious. Concerning the transition of fathers' prenatal to postnatal representations, no effects were found of conscientiousness, extraversion, emotional stability, and openness, even though these variables have been related to parenting behavior in previous studies (Prinzie, Stams, Deković, Reijntjes, & Belsky, 2009).

In clinical practice, the results of this study may be helpful in determining fathers at risk for developing non-balanced postnatal representations. When fathers have non-balanced prenatal representations, they have a larger chance of also having a non-balanced postnatal representations, especially if they already have children, are less agreeable and are profoundly distrustful. In this case, guidance in establishing a connection with the unborn child, for example by interacting with the fetus through touch or by observing the fetus more frequently with the use of ultrasounds, may be helpful (Rosenblum, Dayton, & Muzik, 2009). More research into the practical aspects of enhancing the father-fetus bond will be necessary.

This study provides valuable information about the transition to parenthood of primi- and multiparous fathers and factors that may be associated with this process. However, since this is the first study on this topic, replications of them are needed in order to generalize the results to a broader population. It would be interesting to continue research in this area by also investigating effects of the prenatal and postnatal representations on father-infant attachment, infant development, and on fathers' representations over a longer period of time. Besides that, a direct comparison to mothers' representations would give more insight into similarities and differences in representations between two partners expecting a child.

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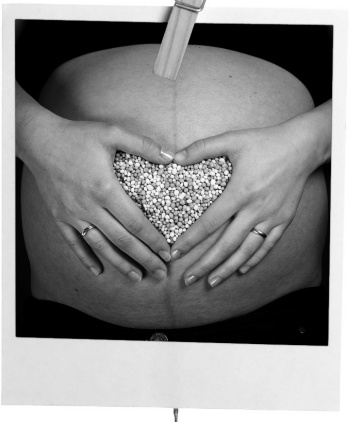

6

Fathers' and mothers' representations of the infant: Associations with prenatal risk factors

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In preparation

ABSTRACT

Background: The parent-infant relationship consists of more than observable interactive behavior between parent and infant, but is also shaped by internal representations. Parents' representations of their infants consist of ideas and expectations they have about (the relationship with) their infants and these are related to the quality of parenting behavior. Nevertheless, little is known about the association between early risk factors for parenting problems (during pregnancy) and the quality of parents' representations of their infants.

Methods: 308 (expectant) mothers and 243 of their partners were followed during pregnancy and after giving birth. Presence of prenatal risk factors was assessed with an adapted version of the Dunedin Family Services Indicator (DFSI-A). At 26 weeks gestational age and six months after birth, parents' representations of their (unborn) children were evaluated with the Working Model of the Child Interview (WMCI).

Results: Prenatal risk factors of parenting problems are associated with parents' representations of their (unborn) infants. Moreover, parents' prenatal representations are related to their representations in the postpartum period. Fathers more often have disengaged representations while mothers more often have balanced representations. Parents expecting their first child also have balanced representations more often than parents who already have children.

Discussion: A prenatal risk inventory for parenting problems (DFSI-A) is associated with parents' representations of their infants six months postpartum. This provides valuable information about which parents may be at risk of developing nonbalanced representations of their (unborn) children. In clinical practice, these families could be monitored more intensively and, if necessary, supported in developing more optimal parent-infant relationships.

BACKGROUND

The quality of the parent-infant relationship is known to have important, long-lasting influences on child development (DeKleyn & Greenberg, 2008; Lyons-Ruth & Jacobvitz, 2008; Rees, 2005; Sroufe, 2005; Sroufe, Egeland, Carlson, & Collins, 2005; Weinfield, Sroufe, Egeland, & Carlson, 2008). To study the quality of this relationship, many studies have focused on interactive behavior between mothers, fathers and infants, with a focus on aspects of parental sensitivity and infant attachment behavior (e.g. Bouchard, 2012; Lucassen et al., 2011; Van IJzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen-Walraven, 2004). However, Stern (1995) argued that the parent-child relationship consists of more than merely observable interactive behavior, but is also shaped by internal representations. These representations can be seen as ideas and expectations parents and their children have about their daily interactions, and were found to be related to the quality of parenting behavior (Schechter et al., 2008; Sokolowski, Hans, Bernstein, & Cox, 2007). Nevertheless, little is known about early risk factors or predictors of parents' representations of their infants.

Parental Representations of their Infants

In general, representations have been described as a set of tendencies to behave in particular ways in intimate relationships, based on ideas, fantasies, and schemes of past experiences in daily interactions (Zeanah & Smyke, 2009). In the context of the parent-infant relationship, parental representations consist of parents' subjective experiences of how they perceive their infants and provide a way of evaluating the 'meaning' an infant has for his/her parent (Benoit, Zeanah, Parker, Nicholson, & Coolbear, 1997). These representations are based on parents' experiences with their infants, as well as on their fantasies, hopes, fears, dreams, and predictions for the infant's future (Stern, 1995).

Parents' representations of their infants generally do not emerge once children are born but parents already start to create representations of their unborn infants during pregnancy (Ammaniti, Tambelli, & Odorisio, 2012; Benoit, Parker, & Zeanah, 1997; Theran, Levendosky, Bogat, & Huth-Bocks, 2005; Vreeswijk, Maas, Rijk, & Van Bakel, 2013). Prenatal representations have been related to the postnatal quality of traditional classifications of infant attachment behavior (Benoit, Parker, et al., 1997). Furthermore, Theran et al. (2005) showed that mothers' prenatal representations are stable into the postnatal period. Especially mothers with optimal representations of their unborn infants are likely to also have optimal representations of their infants when they are one year old. Additionally, suboptimal representations were less stable over time, indicating that these are still open to change during the transition to parenthood. This study has important clinical implications. It shows that it is possible to already get an indication of the quality of the mother-infant relationship in the prenatal period, but it also shows that it is still possible for parents to improve the quality of their representations from the prenatal- to the postnatal phase.

The quality of parents' representations have not been studied in relation to risk factors for parenting problems before. However, several studies did investigate parents' representations in association with characteristics of the parent or infant. Mothers of infants in a clinical setting and of premature born infants more often have suboptimal representations of their infants than mothers of healthy, term-born infants (Benoit, Zeanah, et al., 1997; Borghini et al., 2006; Coolbear & Benoit, 1999; Korja et al., 2009). Furthermore, when mothers experience higher levels of depressive symptoms, hostility and symptoms of posttraumatic stress, they also more often have suboptimal representations of their infants (Korja et al., 2009; Rosenblum, McDonough, Muzik, Miller, & Sameroff, 2002; Sokolowski et al., 2007; Wood, Hargreaves, & Marks, 2004). Rosenblum et al. (2002) found that when mothers have optimal representations of their infants, their infants show more positive affect, more attention-seeking behavior and more contact maintenance. This association was mediated by parenting behavior, because these mothers also show more positive affect during interactions with their infants, while mothers with suboptimal representations show more rejecting behavior. These studies show that various factors may shape the quality of parents' representations.

Thus far, the majority of research concerning the quality of parental representations of their (unborn) infants has been conducted among mothers. This is unfortunate because in Western society, fathers' roles in childrearing have changed over the past decades, where father involvement generally increased in intact families, mainly due to the increase of mothers' participation in the work force (Cabrera, Tamis-LeMonda, Bradley, Hofferth, & Lamb, 2000). Nevertheless, Craig (2006) showed that distinct patterns are found in childrearing practices of mothers and fathers, even when mothers work full-time. For example, fathers generally showed less overall responsibility for managing care of the children than mothers, while they spend more time on interactive activities with their children. It is therefore of great importance to also investigate the quality of fathers' representations of their (unborn) infants, as these may also show distinct patterns from mothers' representations of their infants. If this is the case, results regarding mothers' representations are not to be generalized to fathers. One study suggests that fathers generally show more disengaged representations of their infants during pregnancy than mothers, indicating that they are psychologically less involved with the infant (*Chapter 4).* A limitation of this study is that the distribution of fathers' representations was compared to distributions of mothers' representations as found in the literature from other study samples. The question that remains is whether this difference is also evident when representations of mothers and fathers from the same sample are directly compared and whether this difference persists into the postnatal period.

Risk Factors for Parenting Problems

As mentioned before, whether the quality of parents' prenatal and postnatal representations of their infants is associated with prenatal (risk) factors within the family context has also not been investigated yet. Many studies concerning prenatal factors associated with postnatal parenting have a rather limited scope, by focusing on families referred to Child Protective Services, for example due to child maltreatment or neglect (Putnam-Hornstein, Needell, & Rhodes, 2013). In these specific risk groups, factors that have been found related to child maltreatment are not limited to characteristics of the parent, but also include child- and family characteristics, as well as aspects of the parent-child relationship. A meta-analysis by Stith et al. (2009), showed that parental anger/hyper-activity, family conflict, and family cohesion were important predictive risk factors for child abuse. Child neglect, on the other hand, was found associated with negative parent-child relationships; parental perception of the child as a problem; high levels of stress and parental anger/hyper-activity; and low levels of parental self-esteem. Irrespective of the type of risk factors that exist within a family, the more risk factors present, the higher the potential for negative outcomes (Begle, Dumas, & Hanson, 2010). In general, it appears that child maltreatment is not the result of one specific risk factor, but can be seen as a product of a complex interaction of risk factors in various domains (George, 1996). With regard to parental representations, Sprang, Clark, and Bass (2005) showed that among maltreating parents, the quality of parents' representations of their infants was associated with the severity of maltreatment.

It is important that research of the consequences of risk factors for parenting problems is not limited to families at risk of severe parenting problems such as maltreatment. Also prospective, population-based data are needed to create a better understanding of the distribution of risk factors for parenting problems (Putnam-Hornstein et al., 2013). Several screening inventories to predict later parenting problems and child maltreatment are available that can be conducted in the prenatal phase (Peters & Barlow, 2003). An advantage of these instruments is that they can be used in clinical practice to signal problems within families early on and that adequate support may be provided in the prenatal or perinatal phase, before problems in the parent-infant relationship become evident.

The present study therefore focuses on early, prenatal detection of risk factors for parenting problems within expectant families from a community-based sample and the association between these early risk factors and the quality of mothers' and fathers' prenatal and postnatal representations of their infants. If an association is found between the presence of prenatal risk factors and the quality of parents' representations of their (unborn) children, this could help clinicians working with expectant parents to get a better indication of which families are at risk of developing suboptimal representations of their infants. It is hypothesized that when more risk factors are present in a family during pregnancy, parents will more often have suboptimal prenatal and postnatal representations of their infants.

METHOD

Participants

The current study is part of the "Expectant Parents" project, a prospective longitudinal cohort study on prenatal risk factors and postnatal infant development (*Chapter 2*). The sample consists of 308 expectant mothers with a mean age of 31.60 years (SD = 4.30, range: 17.34-41.88). 243 (79.5%) of their partners, i.e. the fathers of their unborn children, agreed to participate, with a mean age of 34.09 years (SD = 4.53, range: 22.31-49.61). Parents were predominantly Dutch (mothers: 82%, fathers: 80.2%), and their years of education following primary school varied from 0-4 years (mothers: 11.9%, fathers: 10.7%), 5-8 years (mothers: 24.4%, fathers: 21.8%), to 9 years or more (mothers: 63.7%, fathers 65.4%). Most parents were employed at the start of the study (mothers: 87.1%, fathers: 97.9%). For 85.1% of the parents, the pregnancy was planned and 51.6% of the parents were expecting their first child. 51.1% of the children born in our sample were boys. During the time course of the study, some mothers (4.6%) and fathers (7.4%) were lost to follow-up. In total, 294 mothers and 225 fathers participated in both home visits.

Procedure

At 26 weeks gestational age and 6 months postpartum, parents were administered the Working Model of the Child Interview (WMCI) during a home visit to determine the representations they have of their (unborn) infants. Researchers who conducted the interview during the home visit at 26 weeks gestational age also interviewed mothers about several potential risk factors for postnatal parenting problems and child maltreatment, according to items of the adjusted version of the Dunedin Family Services Indicator (DFSI-A). During the course of their pregnancy, mothers had routine check-ups with their midwives, whom were also asked to complete the DFSI-A shortly after the birth of the child.

Measures

Representations of the (Unborn) Baby

The Working Model of the Child Interview (WMCI; Zeanah, Benoit, Hirshberg, Barton, & Regan, 1994) is a semi-structured interview to assess parental representations of their infants. A unique feature of this interview-method is that it can be used to evaluate the quality of parents' representations both during pregnancy and in the postnatal period, which allows for analyses to be conducted about the stability and change of parental representations of their infants during the transition to parenthood (Theran et al., 2005).

The interview is a chronological sequence of questions starting from the moment the parent knew (s)he was expecting a baby, to the present time point, and then continuing with questions about what the parent thinks his/her child will be like as an adolescent and

what their hopes and fears are for their children into adulthood. Questions such as "Pick five words (adjectives) to describe your child's personality" and "How would you describe your relationship to your child now?", provide a manner of eliciting parents' subjective experiences and perceptions of the child, parenting, and the relationship with the child.

The WMCI was conducted among mothers and fathers separately during home visits at 26 weeks gestational age and when infants were six months old. They lasted approximately 45 minutes per interview (range: 30-90 minutes) and each interview was video-recorded and coded afterwards by two trained and reliable coders according to a specific coding scheme (Zeanah, Benoit, Barton, & Hirshberg, 1996). Fifty-nine interviews were double coded, and an inter-rater reliability of 80% was established (Cohen's kappa=.669, p=.000).

Parents' representations were either classified as balanced, disengaged or distorted (Zeanah et al., 1994). When a parent has a *balanced* representation of the infant, (s)he seems to be engrossed in the relationship with the baby and the representation is open to change as new information about the baby becomes available. Parents with *disengaged* representations portray a sense of coolness, indifference or emotional distance from the baby and *distorted* representations are characterized by internal inconsistencies within the representation. Disengaged and distorted representations are also described as "nonbalanced" and are considered suboptimal (Zeanah & Benoit, 1995).

Prenatal Risk Factors

The Dunedin Family Services Indicator (DFSI; Egan et al., 1990; Muir et al., 1989) is an inventory that was developed to assess the risk of parenting problems and child maltreatment during pregnancy. It was found to be effective in predicting parenting difficulty in the two years after birth. Peters and Barlow (2003) showed that the DFSI is a valuable screening inventory for child maltreatment since it obtained acceptable levels of specificity (80%) and sensitivity (64%) in combination with a sufficiently high positive predictive value (48%) to use clinically.

The DFSI is a checklist of items that can be filled in by health care professionals during pregnancy to indicate the number of potential risk factors for parenting problems and child abuse present within a family. The original DFSI consisted of 9 items and for this study it was adjusted somewhat to fit the current Dutch situation. For example, item 7 of the original DFSI "Mother changed her decision regarding adoption of the child" was rephrased as "Mother changed her decision regarding abortion or adoption of the child". Also, several items were added to the original DFSI to include more risk factors predictive of child maltreatment or suboptimal parenting. Table 1 shows the adjusted version of the DFSI (DFSI-A) used in this study. Items 8, 11, 12, 13, 14, 15, 16, and 17 were added to the original DFSI.

In the original study, the DFSI was completed by a multidisciplinary team of health care professionals of a Medical Social Work Department. The total number of risk factors present within a family was added up to create one total score of the DFSI. In the current study, the DFSI-A was used as a checklist to be filled in by researchers after a home visit with expectant

mothers at 26 weeks gestational age. We also asked midwives to complete the DFSI-A shortly after the birth of the child.

Table 1 *Adjusted version of the DFSI (DFSI-A) and prevalence of risk factors according to researchers and midwives (N=291-300)*

Item	Question	Prevalence	
		Researchers *N* (%)	Midwives *N* (%)
1	Mother has had frequent changes of address in the year before delivery. (More than two changes of address in the previous 12 months)	3 (1.03)	4 (1.37)*
2	Mother has had past or present psychological or psychiatric treatment.	105 (35.35)	39 (13.13)***
3	Likely incompetence of mother as a parent because of apparent emotional problems (indicate what this conclusion is based on: e.g., alcohol- or drug abuse within the family; observation of the mother during check-up; past or present criminal behavior; mother will not accept indicated psychological/psychiatric help).	1 (0.34)	7 (2.35)
4	Likely incompetence of the mother as a parent because of apparent lack of intellectual ability (e.g. mother cannot understand or follow simple instructions).	0 (0.00)	1 (0.34)
5	Mother has unrealistic expectations of the new child.	1 (0.34)	1 (1.34)
6	Mother refused (or dropped out of) prenatal classes.	118 (40.27)	38 (12.97)***
7	Mother changed her decision regarding abortion or adoption of the child.	2 (0.67)	1 (0.34)
8	The child is unwanted by mother.	2 (0.67)	1 (0.33)
9	A previous child was abused or neglected.	0 (0.00)	0 (0.00)
10	Mother suffered parental violence or neglect as a child.	1 (0.34)	8 (2.69)
11	Currently there is intimate partner abuse within the family.	0 (0.00)	1 (0.34)
12	Mother has recently experienced major negative life-events (e.g. divorce or separation, death of a loved one, unemployment of herself or her partner, burn-out or work-related problems).	113 (39.24)	29 (10.07)*
13	Mother does not experience enough support from her partner.	21 (7.12)	12 (4.07)**
14	Mother does not experience enough social support.	15 (5.05)	8 (2.69)
15	Mother doubts her own competence as a mother.	15 (5.03)	8 (2.68)
16	Mother is not in a relationship.	9 (3.01)	10 (3.34)
17	Mother/family receives extra assistance, such as care from a social worker or parenting programs.	16 (5.35)	9 (3.01)

Note. Significant difference in reported prevalence (Chi2 *** p<0.001, **p<.01 * p<0.05)

Statistical Analyses

First, descriptive statistics of the studied variables were computed. The difference in total risk factors reported by researchers and midwives on the DFSI-A was tested with an independent samples t-test. Differences in the prevalence of the individual items on the DFSI-A reported by researchers and midwives were tested with Chi-square analyses.

To test whether prenatal risk factors of the DFSI-A are related to parents' prenatal and postnatal representations of the (unborn) baby (WMCI) and whether prenatal representations are stable into the postnatal period, four sets of multinomial logistic regression analyses were performed. With a multinomial logistic regression model, the influence of several independent variables on a categorical dependent variable with more than two categories (i.e., WMCI categories balanced/disengaged/distorted) can be investigated. The first analysis determined the effect of the total DFSI-A score on mothers' prenatal WMCI classifications. Second, the effect of the total DFSI-A score in combination with mothers' prenatal WMCI classification on their postnatal WMCI classifications was determined. This way, the stability of mothers' WMCI classifications in the transition to parenthood could be determined as well. The procedure described above was repeated for fathers in the third and fourth analyses. Parity was added as a predictor variable to the analyses to control for its potential confounding effects on parents' representations.

RESULTS

Descriptive Analyses

Prenatal Risk Factors

The prevalence of risk factors indicated by researchers and midwives on the DFSI-A is reported in Table 1. The total number of risk factors reported by researchers differed significantly from what was reported by midwives, t=13.59, p<.001 (M=1.44, SD=1.23, range: 0-6 and M=0.39, SD=0.87, range: 0-5 respectively). The prevalence between researcher-reported and midwife-reported factors especially differed on items 1, 2, 6, 12, and 13 (χ^2=5.08-63.72, df=1, p=.000-.041). Since researchers reported significantly more risk factors after having directly interviewed parents at 26 weeks gestational age during a home visit about several of the topics of the DFSI, these scores were used in the further analyses of this study.

Distribution of Prenatal and Postnatal WMCI Classifications

In Table 2, the distributions of parents' pre- and postnatal WMCI classifications are listed. To examine whether distributions between mothers and fathers differed significantly, Chi-square analyses were performed. Both in the prenatal and postnatal period, the distributions of mothers and fathers significantly differed from each other (prenatal: χ^2=28.58, df=2, p<.001; postnatal: χ^2=8.62, df=2, p=.013). Specifically, fathers more often showed disengaged representations of the (unborn) baby and mothers more often had balanced representations. In the prenatal period, fathers also showed fewer distorted representations than mothers.

Additionally, substantial differences were found in the distributions of parents' prenatal and postnatal classifications (mothers: χ^2=15.73, df=2, p<.001; fathers: χ^2=31.29, df=2, p<.001). In the postnatal period, mothers more often had balanced representations and had fewer disengaged representations than in the prenatal period. Fathers showed a similar pattern, but also more often had distorted representations when infants were born than during pregnancy.

Table 2 *Distributions of mothers' and fathers' pre- and postnatal WMCI classifications.*

		Balanced *N* (%)	Disengaged *N* (%)	Distorted *N* (%)	Total *N*
Mothers	Prenatal WMCI	188 (61.0%)	83 (26.9%)	37 (12.0%)	308
	Postnatal WMCI	215 (73.1%)	41 (13.9%)	38 (12.9%)	294
Fathers	Prenatal WMCI	106 (43.6%)	119 (49.0%)	18 (7.4%)	243
	Postnatal WMCI	145 (64.4%)	54 (24.0%)	26 (11.6%)	225

Prenatal Risk Factors and Parents' Representations of the (Unborn) Infant

Mothers' Prenatal Representations

The first multinomial regression analysis predicted the odds of mothers having balanced, disengaged or distorted representations in the prenatal period. Parity and the total score on the DFSI-A were used as predictors. The model fit was significant, indicating that the main effects model fit significantly better than the null model, χ^2=35.81, df=4, p<.001. Both parity (χ^2=12.69, df=2, p=.002) and the number of prenatal risk factors on the DFSI-A (χ^2=19.84, df=2, p<.001) significantly influenced the odds of mothers having a balanced, disengaged, or distorted representation.

When keeping the number of risk factors constant, the analyses showed that mothers who already have children have higher odds of a disengaged instead of a balanced prenatal representation (OR = 2.55, 95% CI [1.47-4.41]). Parity did not significantly influence the odds of having a disengaged versus a distorted representation (p=.589). Furthermore, mothers with more prenatal risk factors on the DFSI-A more often had distorted than balanced (OR = 1.78, 95% CI [1.35-2.34]) or disengaged prenatal representations (OR = 1.90, 95% CI [1.38-2.61]) , when parity is kept constant. In the prenatal period, one additional risk factor on the DFSI-A increases mothers' odds of having a distorted instead of a balanced representation by 77.5% and of having a distorted instead of a disengaged representation by 89.65%.

Mothers' Postnatal Representations

The second multinomial regression analysis predicted the odds of mothers having balanced, disengaged or distorted representations in the postnatal period. Parity and the total score on the DFSI-A were again used as predictors, and also mothers' prenatal WMCI classification was added as a predictor to the model. The model fit was again significant (χ^2=68.92, df=8, p<.001), as were the main effects of parity (χ^2=6.61, df=2, p=.037), number of risk factors on the DFSI-A (χ^2=6.06, df=2, p=.048) and prenatal WMCI classification (χ^2=42.16, df=4, p<.001).

The effect of parity on mothers' postnatal representations was similar to its effect in the prenatal period. Mothers who already have children are at increased odds of having a disengaged instead of a balanced postnatal representation (OR = 2.70, 95% CI [1.23-5.95]) while parity does not influence the odds of having a disengaged versus a distorted representation (p=.186). Where in the prenatal period the number of risk factors on the DFSI-A was predictive of the odds of having a distorted representation, in the postnatal period mothers with more risk factors had increased odds of having a disengaged instead of a balanced representation (OR = 1.41, 95% CI [1.02-1.94]). The presence of one additional risk factor on the DFSI-A increases the odds of having a disengaged instead of a balanced postnatal representation by 40.65% when keeping the other variables constant. The number of risk factors did not influence mothers' odds of having a distorted representation instead of a balanced (p=.087) or disengaged representation (p=.652).

Concerning the transition of mothers' representations over time, mothers with a disengaged representation of the unborn child are at increased odds of also having a

disengaged postnatal representation, instead of a balanced (OR = 3.78, 95% CI [1.02-14.02]) or distorted (OR = 23.70, 95% CI [4.96-113.31]) representation. Also, when mothers have either a balanced or disengaged prenatal representation, the odds of developing a distorted instead of a balanced postnatal representation decrease significantly (OR = 0.16, 95% CI [0.07-0.40] and OR = 0.16 95% CI [0.05-0.53] respectively).

Fathers' Prenatal Representations

The third multinomial regression analysis tested a model to predict fathers' prenatal representations. The model as a whole was significant (χ^2=17.11, df=4, p=.002) and so was the main effect of parity (χ^2=14.90, df=2, p=.001). When keeping the number of prenatal risk factors constant, fathers who already have one or more children more often have a disengaged representation of the unborn baby instead of a balanced representation (OR = 2.89, 95% CI [1.64-5.09]). In contrast to what was found among mothers, the number of prenatal risk factors on the DFSI-A was not significantly related to fathers' prenatal WMCI classification (χ^2=4.49, df=2, p=.106).

Fathers' Postnatal Representations

The fourth and final model of this study tested the influence of parity, prenatal risk factors and prenatal WMCI classification on fathers' postnatal representations of their infants. The model fit was significant (χ^2=58.15, df=8, p<.001) and so were the effects of number of risk factors on the DFSI-A (χ^2=7.58, df=2, p<.023) and fathers' prenatal WMCI classification (χ^2=36.70, df=4, p<.001). The effect of parity was significant at the level of α=.1 (χ^2=5.78, df=2, p<.056) and was similar to its effect on fathers' prenatal representations and on mothers' pre- and postnatal classifications. Fathers who already have children are at increased odds of having disengaged instead of balanced representations (OR = 2.33, 95% CI [1.12-4.89]).

As was found among mothers, fathers of families with a higher number of prenatal risk factors on the DFSI-A had higher odds of having a disengaged postnatal representation instead of a balanced representation (OR = 1.51, 95% CI [1.09-2.11]). One additional risk factor on the DFSI-A increases the odds of having a disengaged instead of a balanced postnatal representation by 51.44% when keeping the other variables constant. Also for fathers, the number of risk factors did not influence the odds of having a distorted postnatal representation instead of balanced (p=.063) or disengaged (p=.857).

When considering the effect of fathers' prenatal representations on their postnatal representations, fathers with a balanced prenatal representation of the unborn child have increased odds of also having a balanced instead of disengaged postnatal representation, (OR = 2.04, 95% CI [1.64-36.18]). Furthermore, fathers with a disengaged prenatal representation have higher odds of having a disengaged instead of a distorted postnatal representation (OR = 6.53, 95% CI [1.54-27.68]) and fathers' odds of having a distorted instead of balanced postnatal representation are lower when they have a balanced (OR = 0.07, 95% CI [0.02-0.28]) or disengaged (OR = 0.14, 95% CI [0.04-0.53]) prenatal representation.

DISCUSSION

This study shows that the number of risk factors on a risk inventory for parenting problems and child maltreatment in the antenatal period is associated with parents' representations of their infants six months postpartum. Even after controlling for the effects of parents' prenatal representations of their unborn infants, a higher number of prenatal risk factors within a family is related to a suboptimal quality of the postnatal parent-infant relationship, both among mothers and fathers. Additionally, parents' prenatal representations are significantly associated with their postnatal representations. Differences in distributions of parents' representations of their infants were also found in the pre- and postnatal period. Both mothers and fathers more often have balanced representations of their infants once they are born than during pregnancy and fathers generally have more disengaged representations than mothers, both in the pre- and postnatal period.

Prenatal Risk Factors

Studies concerning the effects of prenatal risk factors for parenting problems were usually conducted among children that are reported to Child Protective Services for maltreatment (Putnam-Hornstein et al., 2013). However, this is a very specific group of children and these studies do not inform how prevalent these risk factors are in community based samples and whether they are also related to broader concepts of a suboptimal parent-infant relationship. Since parents' internal representations of their infants were found to be related to the quality of parenting behavior (Schechter et al., 2008; Sokolowski et al., 2007), we expected that risk factors of parenting problems would also be related to parents' representations during pregnancy and in the postnatal period. The results of the present study showed that during pregnancy, in fathers, the number of risk factors was not related to their representations of their unborn infants. Mothers, however, more often had distorted instead of balanced prenatal representations of their infants when more risk factors were present during pregnancy. Postnatally, more risk factors were found to be associated with more disengaged instead of balanced representations of the infant both among mothers and fathers.

The results of the present study thus show that risk factors that were found to be predictive of parenting problems and maltreatment in earlier studies are also associated with the quality of parents' representations of their infants prenatally and in the postpartum period. This suggests that the DFSI-A could be used in clinical practice to prenatally identify families who are at increased risk of developing a suboptimal parent-infant relationship within a broader context than maltreatment. These families could be monitored more closely, for example by National Health Care Centers, in the early postnatal period.

Representations of the (Unborn) Infant

This study was the first in which distributions of mothers' and fathers' representations of their (unborn) infants are directly compared. Earlier studies using the WMCI mainly focused on maternal representations. During pregnancy, fathers more often had disengaged representations of the unborn baby while mothers more often had balanced representations. This may be due to the fact that fathers generally will have had fewer opportunities to interact with their unborn baby and therefore it may have been more difficult for them to envision the fetus as a real person when they had not met him/her. Mothers, on the other hand, at 26 weeks gestation were able to feel the baby move and could physically feel changes in their bodies due to the pregnancy.

A rather surprising finding was that when infants were 6 months old, fathers still more often had disengaged representations than mothers. Results from a meta-analysis by Van IJzendoorn and De Wolff (1997) show that the frequency of secure and insecure attachment relationships children form with mothers and fathers generally does not seem to differ. An explanation for our finding may be the time point at which parents' representations were evaluated. Even though fathers will also have had opportunities to interact with their infants from the time they were born, mothers often have the role of primary caregiver in the first months after birth and generally spend more time with their infants than fathers. Many mothers breastfeed their child and in the Netherlands they are entitled to 10-12 weeks of paid maternity leave after giving birth. Fathers, on the other hand, are entitled to two days of paid leave and generally work more hours per week than mothers. Therefore, fathers may more often be less involved with their infants and may more often experience a distance in the relationship with the young infant than mothers.

Concerning parents' representations during the transition to parenthood, both mothers and fathers more often had balanced representations in the postnatal than in the prenatal period. However, parents' prenatal representations were also found to be associated with the quality of their postnatal representations. These results are consistent with earlier studies (Benoit, Parker, et al., 1997; Theran et al., 2005) and confirm that the parent-infant relationship does not emerge after the birth of the child but evolves and can be assessed during pregnancy, for both mothers and fathers.

One limitation of this study is that the above mentioned results were based on the DFSI-A completed by researchers who visited families at 26 weeks gestational age instead of those completed by midwives. The midwives who participated in this study generally identified fewer risk factors within families than the researchers. This difference may be explained by the way the midwives and researchers were instructed to complete the DFSI-A. Midwives were asked to provide prenatal care as usual for all women participating in the study and to complete the DFSI-A as soon as possible after the birth of the child. Hence throughout pregnancy, they provided care for the expecting mothers and their unborn babies and spoke with the mothers (and fathers) about all types of pregnancy-related issues, but did not

necessarily discuss all topics of the DFSI-A in de detail with them. The various items of the DFSI-A nevertheless, are items that are relevant for midwives to discuss with mothers during the prenatal consultations, as they provide important information about the family context in which the baby will be born. The researchers who visited participants during home visits, however, did consistently discuss several of the risk factors of the DFSI-A with mothers when they were 26 weeks pregnant and then completed the DFSI-A. Researchers especially identified more mothers with risk factors on items 1, 2, 6, 12, and 13 of the DFSI-A, factors of which several studies have shown they are related to adverse parenting outcomes and child abuse (Muir et al., 1989; Stith et al., 2009; Wilson et al., 1996). We believe, nevertheless, the DFSI-A is still suitable for use by midwives or obstetricians in clinical practice, if they are instructed to consistently ask mothers about the presence of the risk factors of the DFSI-A.

The prenatal risk factors that were investigated in this study mainly focused on expectant mothers. Items of the DFSI-A that specifically concern fathers were limited. This was due to the fact that the DFSI was originally designed to be completed by health care professionals working with pregnant women (Egan et al., 1990). Also in our study, the DFSI-A was completed by midwives, who provide care for the mother and fetus and do not always meet the father during consultations. Still, the number of risk factors recorded on the DFSI-A was predictive of fathers' postnatal representations of the infant as well. In future studies, it would be interesting to investigate whether adding risk factors specifically concerning fathers would yield even stronger relationships between the DFSI-A and parental representations.

Implications for Future Research and Clinical Practice

Since this is the first study to focus on prenatal risk factors of parenting problems and parents' representations of their infants, it is important that the results are replicated and that research on this topic is expanded. In future research, the focus should also be on outcome measures of child development, parenting problems, and maltreatment. Questions that remain unanswered are, for example: Are parents more likely to experience parenting problems or maltreat their children if they have nonbalanced (prenatal) representations of their children? Will children whose parents have nonbalanced representations show more internalizing or externalizing behavioral problems later in life and will the risk factors that were found during pregnancy also be predictive of these problems? And which interventions provide opportunities to improve parents' representations of their (unborn) children?

The results show that the DFSI-A is a useful instrument to screen families in the prenatal period for the presence of potential risk factors indicative of suboptimal parent-infant relationships. When midwives or obstetricians are instructed to consistently discuss the topics of the DFSI-A with pregnant women (and their partners), this gives valuable information about which parents are at risk of developing nonbalanced representations of their (unborn) children. Subsequently, these families could be monitored more intensively and, if necessary, supported in developing more optimal parent-infant relationships.

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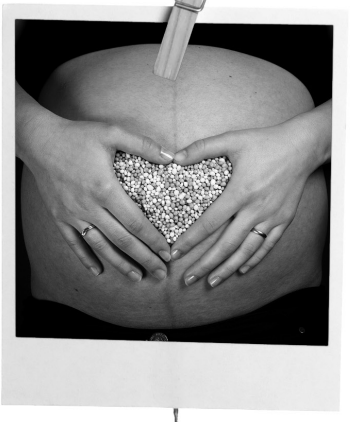

7

Summary and General Discussion

The general aim of the studies presented in this thesis was to provide more insight into representations that parents have of their (unborn) infants during pregnancy and in early infancy, with a special focus on the experiences of *fathers* during this period of transition to parenthood. Although the importance of the father-infant relationship had been acknowledged in developmental research for years (Bretherton, 2010; Lamb, 2010), knowledge about fathers' representations of their infants was still lacking and the quality of fathers' representations in the pre- and postnatal period had not been examined (*Chapter 3*). Representations concern sets of tendencies to behave in particular ways in intimate relationships (Zeanah & Smyke, 2009). They already develop during pregnancy, when parents prepare themselves for life with the infant (Condon, 1993; Habib & Lancaster, 2010; Righetti, Dell'Avanzo, Grigio, & Nicolini, 2005). This thesis extends the existing knowledge on parents' representations of their infants by examining fathers' and mothers' representations in the pre- and postnatal period and factors that are associated with the quality of these representations. In this final chapter, the main findings of the studies reported in this thesis are discussed and implications for clinical practice and suggestions for future research will be presented.

The "Expectant Parents" Study

The empirical studies presented in this thesis were embedded in a prospective longitudinal cohort study referred to as the "Expectant Parents" study. *Chapter 2* provides an extensive overview of the purposes and methods of the "Expectant Parents" study, as well as a description of the participants. Fathers and mothers from a healthy community sample were followed from 15 weeks of gestation until their infants were 12 months old. Both families with first-born and later-born children were included. To investigate parents' representations of their (unborn) infants, parents were asked to participate in interviews that were conducted during two home visits; at 26 weeks gestational age and when infants were six months old. In total, 311 mothers and 243 fathers of the "Expectant Parents" sample participated in home visits when mothers were approximately 26 weeks pregnant.

Mothers who participated in the study by completing questionnaires, but did not participate in home visits, more often expected their first child (X^2 (1, N = 403) = 3.93, p = .047) and had completed fewer years of formal education (X^2 (2, N = 401) = 8.19, p = .017) than mothers who did participate. There were no differences in the distribution of nationality. Fathers who completed more years of formal education more often participated in the home visits than fathers who completed fewer years of education (X^2 (2, N = 259) = 8.35, p = .015). When infants were six months old and parents were again asked to participate in a home visit, 14 mothers (4.55%) and 18 fathers (7.41%) were lost to follow up. The differences in demographic factors may have influenced the distributions of parental representations found in our samples, which could have reduced the generalizability of these findings to the Dutch population.

Parental Representations of the Infant

As discussed in *Chapter 1* of this thesis, parents' representations of their infants play an important role in determining the quality of the parent-infant relationship. Representations provide valuable information about how parents think and feel about their infants and they are related to the quality of parent-infant interactive behavior (Korja et al., 2010; Schechter et al., 2008; Sokolowski, Hans, Bernstein, & Cox, 2007; Zeanah, Benoit, Hirshberg, Barton, & Regan, 1994). Parents' representations of the relationship with their infants can be elicited with the Working Model of the Child Interview (WMCI; Zeanah, Benoit, Barton, & Hirshberg, 1996). *Chapter 3* provides a description of the interview procedure as well as a systematic review of results from empirical research conducted with the WMCI.

This investigation of literature revealed that the majority of the studies using the WMCI were conducted among clinical samples with sample sizes that were relatively small. This may be due to the fact that conducting and coding the WMCI is rather labor-intensive. Generally, it takes 45 to 60 minutes to conduct the interview, and coding the interview afterwards takes at least the same amount of time. However, the WMCI provides valuable information about ideas, expectations, and experiences that parents have concerning their children, which cannot be captured by questionnaires. Furthermore, the interview can be used to assess representations of mothers and fathers both in the pre- and postnatal period. Until now all studies in which the WMCI was used to investigate parents' representations of their (unborn) children were only conducted among mothers, mostly in the postnatal phase.

In sum, previous studies using the WMCI showed that the quality of mothers' representations was associated with several mother- and child characteristics, such as the (mental) health status of mothers and infants. Also, prenatal and postnatal representations were found to be related to each other, as well as to the quality of the infant-parent attachment relationship, parent-infant interaction, and parenting behavior. What had not been examined, is whether these associations also hold for fathers' representations of their (unborn) infants, and whether the distributions of fathers' representations show similar patterns to those of mothers. In this thesis, we therefore emphasized on fathers' pre- and postnatal representations of their infants as well as on factors that may influence the quality of their representations.

Fathers' and Mothers' Representations: Distributions and Differences

In *Chapter 4*, the distribution of fathers' prenatal representations found in our sample was compared to distributions of mothers' prenatal representations found in other studies. These distributions differed significantly. Mothers more often had balanced representations of their unborn infants and fathers more often showed disengaged representations. In *Chapter 6*, the distributions of mothers' and fathers' representations from our sample were directly compared, both in the pre- and postnatal phase[1]. The results confirmed that fathers

1 The distribution of prenatal representations in the group of parents that was lost to follow-up did not differ significantly from the distribution of representations among parents who did participate in the postnatal home visits (mothers X^2 (1, N = 308) = 2.04, p = .153; fathers X^2 (1, N = 243) = 3.62, p = .057).

more often have disengaged prenatal representations than mothers, and revealed that this difference is still apparent when infants are six months old. This latter finding was against expectations, because fathers will generally have had many opportunities for interacting with the infant by the time infants are six months old. The difference between fathers and mothers in the postnatal period may be due to the fact that, despite changes in role patterns over the past decades, in the first six months of life, mothers are still often the primary caregiver (Craig, 2006).

When considering the stability of parents' representations over time, prenatal representations were found to be associated with postnatal representations, both among fathers and mothers. Additionally, fathers and mothers both more often had balanced representations in the postnatal period than prenatally. These results suggest that although their distributions differ, the transition to parenthood for both mothers and fathers may be similar with regard to the representations they have of their (unborn) infants.

Development of Fathers' Representations

During the prenatal period, a father's perceptions of the infant will be based on different experiences than a mother's perceptions of the infant, as she physically carries the infant. It was expected that it may be more difficult for fathers to start to create a relationship with the unborn infant than for mothers, as they have fewer opportunities to interact with the infant during pregnancy. As described in *Chapter 4*, we investigated fathers' experiences with their unborn babies by assessing two conceptually different processes, i.e. fathers' feelings of prenatal attachment and fathers' representations of their unborn infants. Prenatal attachment focuses on more concrete behaviors and feelings that demonstrate care and commitment toward the unborn infant (Van den Bergh & Simons, 2009), while representations are more abstract ideas, fantasies, and schemes on which interactions with the infant are based (Zeanah & Smyke, 2009).

Fathers' feelings of prenatal attachment and their representations of the fetus were found to be interrelated in a multinomial logistic regression analysis. When fathers reported a higher quality of prenatal attachment, they were more likely to have balanced representations of their unborn children. On the other hand, fathers with a lower quality of attachment were more likely to show disengaged representations. Furthermore, the quality of fathers' self-reported prenatal attachment was higher when fathers experienced fewer symptoms of depression and anxiety during pregnancy, when they were younger, and when they expected their first child. However, no associations were found between these psychosocial and demographic characteristics and fathers' representations of their unborn children.

The results confirm that forming a prenatal attachment relationship with the fetus and the development of prenatal representations of the infant are two related, but also distinct, processes. Prenatal attachment focuses on behaviors, attitudes, thoughts, and feelings that demonstrate care and commitment toward the fetus (Van den Bergh & Simons, 2009). For

example, fathers were asked whether they would like to hold the baby after birth and whether they feel happy when thinking about the baby (Condon, 1993). When a father responds to these questions in a manner that indicates a high level of prenatal attachment (i.e. he wants to hold the baby directly after birth and feels very happy when thinking about the baby), he does not yet need to have an image of who his baby is as a person. This is different when considering prenatal representations. Representations are more detailed ideas, fantasies, and schemes in the parent's mind, based on daily interactions and experiences (Zeanah, 2000). For fathers, it may be difficult to have daily interactions with their unborn infant. Nevertheless, the focus of assessing prenatal representations is on the current image fathers have of the infant. They are, for instance, asked to describe the personality of the unborn infant and the current relationship they have with him/her (Zeanah et al., 1996). This requires the father to have more explicit ideas about the baby's personality and his relationship with the unborn infant.

Overall, fathers who reported stronger feelings of prenatal attachment more often had balanced representations of their unborn infants. However, even when a father reports relatively strong feelings of prenatal attachment, he may still be unable to form a clear mental image of the infant and his relationship with the infant, which is reflected in disengaged representations. Developing a representation or internal working model consists of more than merely having feelings about the fetus or infant. It requires the father to reflect on the infant's personality and the relationship with the infant. These reflections then form the basis of mental schemes which shape fathers' emotional, cognitive, and behavioral responses in the relationship with the (unborn) infant (Benoit, Zeanah, Parker, Nicholson, & Coolbear, 1997). When considering the reverse situation, it is unlikely that a father with few feelings of prenatal attachment (e.g., a father who responds he does not want to hold the baby directly after birth and does not feel happy when thinking about the baby) will have a balanced representation of the infant. One may suggest that the concept of prenatal attachment is a more general concept than that of prenatal representations. To develop an optimal representation of the unborn infant, a certain degree of prenatal attachment seems to be necessary.

After studying fathers' representations during pregnancy, we assessed whether these representations were stable from the prenatal to the postnatal period. As reported in *Chapter 5*, compared to the prenatal period, fathers more often had balanced representations when infants were six months old. Additionally, the quality of fathers' prenatal representations was found to be highly predictive of the quality of their postnatal representations. Especially when fathers had a balanced *prenatal* representation, the odds of having a balanced postnatal representation were much higher than when they had a nonbalanced prenatal representation. When fathers are able to create a positive, coherent mental scheme of (the relationship with) their unborn baby based on the experiences during pregnancy, this will result in a balanced representation. If this process already takes place before the birth of the baby, it seems to serve as a protective factor against the development of nonbalanced

postnatal representations once the infant is born. These findings confirm that fathers' experiences during pregnancy have important implications for the quality of the postnatal representations they have of their infants.

Psychosocial and Demographic Factors in Relation to Parental Representations

In *Chapter 5*, the influence of several paternal characteristics on fathers' prenatal and postnatal representations was investigated. No significant effects of these paternal characteristics on the quality of their prenatal representations were found. When considering the transition of fathers' prenatal to postnatal representations, it was found that the odds of having a balanced postnatal representation increase when fathers are more agreeable and when they are less profoundly distrustful. These findings show that when fathers have nonbalanced prenatal representations, they do not all have equal chances of altering these representations into balanced representations after birth.

Especially fathers who are more agreeable or friendly and who feel that they can trust on support from intimate and peer relationships themselves, seem to have capacities or characteristics that enable them to create a balanced representation once the infant is born, even if they were not able to form a balanced representation of the infant during pregnancy. Fathers with balanced representations generally value the relationship with the infant and consider it to have effects on the infant's behavior and development and are sensitive in their caregiving behavior (Zeanah et al., 1996). Fathers who find they cannot trust other people, by definition prefer not to invest in relationships with other people (Holmes & Lyons-Ruth, 2006). This will make it very difficult, if not impossible, for them to create balanced representations of the relationships with their infants. On the other hand, fathers who are more agreeable are characterized as being cooperative, trustful, and socially adaptable (John & Srivastava, 1999). It has been found that people who are more agreeable, are less avoidant in close relationships (Fraley, Heffernan, Vicary, & Brumbaugh, 2011). Hence, more agreeable fathers are more likely to emotionally invest in the relationship with their infants and will therefore more often shift from a nonbalanced prenatal representation to a balanced postnatal representation.

Contrary to our expectations, no associations were found between fathers' pre- and postnatal representations and their psychological well-being *(Chapters 4 and 5)*. Studies among mothers have shown negative associations between maternal symptoms of anxiety and depression and the quality of their representations (Korja et al., 2009; Rosenblum, McDonough, Muzik, Miller, & Sameroff, 2002; Schechter et al., 2008; Schechter et al., 2005; Wood, Hargreaves, & Marks, 2004), however, mostly these associations were found when mothers have a distorted representation of the infant. In our sample, relatively few fathers had distorted prenatal or postnatal representations (7.4% and 11.6% respectively). This may be due to the fact that we used a low-risk community sample, while studies concerning the relation between anxiety and depression and mothers' representations were generally conducted among clinical samples.

The relationship between prenatal psychosocial risk factors and pre- and postnatal representations of both mothers and fathers was examined in *Chapter 6*. A higher score on a 17-item risk inventory was related to mothers more often having distorted prenatal representations. Additionally, an increased number of prenatal risk factors was related to fathers and mothers more often having disengaged representations in the postnatal period, even when controlling for the quality of their prenatal representations. Disengaged representations are characterized by a lack of personal or emotional involvement with the infant and the parent-infant relationship. When one or several risk factors are present within a family during pregnancy, this may still have effects in the postnatal period. For example, psychological complaints of the mother, negative life events, and lack of social support during pregnancy may not be resolved within a short period of time and their consequences may last into the postpartum period (Rubertsson, Wickberg, Gustavsson, & Rådestad, 2005; Zelkowitz et al., 2008). In addition to becoming a parent, some parents also have other major concerns that require their attention. These concerns may interfere with the opportunity for parents to emotionally invest in building an optimal relationship their young infants, leading to a higher frequency of disengaged representations when more prenatal risk factors were present. This is in line with findings from a longitudinal study which showed that increased maternal depression and worsening financial circumstances predicted deterioration in the quality of parenting and that decreases in maternal depression and improvements in social support and maternal general health were related to improved quality of parenting (Waylen & Stewart-Brown, 2010).

One of the demographic factors that we investigated in relation to parents' representations was parity. As mentioned before, in *Chapter 4*, no associations were found between parity and the quality of fathers' prenatal representations. In *Chapter 5*, using the same sample, similar analyses did show a significant effect of parity on fathers' representations. Fathers who already had one or more children had higher odds of developing nonbalanced representations than fathers expecting their first child. This apparent discrepancy may be explained by the fact that in *Chapter 4*, parity was significantly related to fathers' levels of prenatal attachment. Since both variables (i.e, parity and prenatal attachment) were entered into the regression model as predictors, parity did not have a unique contribution in predicting the quality of prenatal representations. When the same analysis is conducted without prenatal attachment as independent variable, the effect of parity is significant (X^2 (2, N = 219) = 13.08, p = .001). This is in accordance with the findings presented in *Chapter 6*, where parity was found to be related to mothers' and fathers' pre- and postnatal representations. In all cases, when parents expect their first child, the odds are greater that they will have a balanced representation of the (unborn) infant.

Strengths and Limitations of the Study

This thesis adds to existing knowledge of parents' representations of their infants by investigating representations of fathers as well as mothers both in the prenatal and postnatal phase. Important strengths of this study are its longitudinal design and the large study sample including both mothers *and* fathers. Our results from a community-based sample reflect the transition to parenthood in a low-risk sample. Another strength of this thesis is that it was among the first to explore fathers' representations of their infants, both in the prenatal and postnatal period, and to directly compare them to maternal representations. Additionally, previous studies had not investigated the association between prenatal psychosocial risk factors and the quality of parents' pre- and postnatal representations.

Despite the strengths of these studies, the results must also be interpreted within the context of their limitations. The initial sample size of the "Expectant Parents" study was larger than the samples used in this thesis because not all parents were willing to consent to participate in home visits, during which the interviews to evaluate their representations were conducted. In comparison to fathers, mothers more often agreed to participate in the home visits, resulting in a larger study sample of mothers than fathers. Nevertheless, the sample size of fathers participating in the interviews was still larger than the sample sizes generally reported in studies using the WMCI (*Chapter 3*).

It may be the case that parents with balanced representations were more likely to participate in the study. Parents with balanced representations are generally more involved with their (unborn) infants and the parent-infant relationship and may therefore be more willing to speak to a researcher about their (unborn) infant during a home visit. For example, it has been found that father participation in family research is lower in families with less optimal parenting environments (Costigan & Cox, 2001). Also, our sample was relatively highly educated, with most parents having completed nine years or more of formal education following primary school, in comparison to 28% of the general Dutch population in 2007 (Janssen, 2008). Possibly the parents that chose to participate in our study were more likely to consent to home visits by a researcher because they are more aware of the importance of scientific research.

A limitation specifically concerning *Chapter 6* is the use of the prenatal risk inventory by researchers. In former studies this inventory was administered by health care professionals in clinical practice. Our results showed differences in the number of risk factors reported by midwives and by researchers. Midwives reported very few risk factors were present within most families after guiding mothers throughout their pregnancies and discussing the subjects on the risk inventory with them as they came up during consultations. In contrast, researchers who structurally questioned mothers about several of the topics on the risk inventory, reported more risk factors were present within these families. Since we think that systematic questioning of mothers about risk factors led to a more accurate recording of these risk factors within the families, we decided to use the researcher-reported risk inventories in

the statistical analyses, even though the inventory was meant as a quick-to-administer clinical instrument. We suggest that if midwives are instructed to consistently speak to expectant mothers about each topic of the risk inventory, the instrument may still be suitable to be used in clinical practice, because in the original studies concerning this risk inventory, health care professionals also interviewed mothers about the presence of each risk factor (Muir et al., 1989).

Clinical Implications

The results of the studies in this thesis have clinical implications for psychologists, psychiatrists, midwives, obstetricians, gynecologists, nurses, and other (mental) health care professionals working with pregnant women and their partners. First and foremost, the results highlight that during pregnancy, fathers' experiences are important to acknowledge, as they are related to fathers' postnatal representations of their infants. Earlier research showed that the quality of prenatal attachment in fathers is related to the quality of postnatal father-infant attachment (Condon, Corkindale, Boyce, & Gamble, 2013) and our research has further shown that the quality of fathers' prenatal representations is associated with their postnatal representations of the infant (*Chapter 5*). These factors may be predictive of later quality of father-infant interaction, infant attachment behavior and parenting, as was found among mothers (Benoit, Parker, & Zeanah, 1997; Dayton, Levendosky, Davidson, & Bogat, 2010; Korja et al., 2010; Schechter et al., 2008; Sokolowski et al., 2007; Theran, Levendosky, Bogat, & Huth-Bocks, 2005; Zeanah et al., 1994).

When considering differences in distributions of parental representations, fathers more often had disengaged representations than mothers, even once their children were born. This suggests that there are differences between fathers' and mothers' representations of their infants which may reflect a 'normal' process in fathers, instead of a deviance. Fathers do not physically carry the infant during pregnancy and are generally less involved in caregiving during the first months of life than mothers, for example due to breastfeeding and maternity leave. Research has shown that even when mothers work full-time, they spent more overall time with their children, carry more overall responsibility and manage their care more than fathers (Craig, 2006) The lack of early (physical) contact may hinder fathers in developing balanced internal working models in this early period. Further research is needed to establish whether fathers' representations continue to be stable over a longer period of time after birth and whether they are also related to the later father-infant attachment relationship or aspects of child development. Since no difference are found between infant-father and infant-mother attachment distributions (Van IJzendoorn & De Wolff, 1997), it is possible that distributions of the quality of mothers' and fathers' representations of their infants during the first years of life will also show fewer differences as children grow older.

Furthermore, when more psychosocial prenatal risk factors are present, both mothers and fathers are more likely to have nonbalanced representations of their children. Since past

research has shown that nonbalanced representations are related to insecure attachment behavior of infants and to suboptimal interactive and parenting behavior later in life (Benoit, Parker, et al., 1997; Dayton et al., 2010; Theran et al., 2005), it is important that health care professionals working with parents in the prenatal period are aware of the fact that they may have an important role in signaling which parents are at higher risk of developing nonbalanced representations of their infants. A standardized instrument such as described in *Chapter 6*, could be used by midwives and obstetricians to determine which families are at risk of developing suboptimal parent-infant relationships. It is important that when implementing such a risk inventory in clinical practice, health care professionals are very consistent in questioning parents about the presence of the risk factors. In our study we found that midwives reported fewer psychosocial risk factors than researchers during a home visit. This suggests that parents may be reluctant to discuss and report the presence of these factors during regular consultations with their midwives and when not being asked about them specifically (*Chapter 6*). If an inventory of psychosocial risk factors were to be implicated in the present prenatal health care system in the Netherlands, this could provide a standardized transfer document to the postnatal health care professionals, indicating which families may benefit from existing (mental) health care or parenting programs.

Suggestions for Future Research

Although the findings of this thesis have led to more insight in the development of parental representations, in factors associated with the quality of these representations, and in differences in mothers' and fathers' representations of their infants, more research is needed. These studies were among the first to specifically report about fathers' representations and concern factors that are associated with the development of these representations. Further research is needed to determine the relationship between fathers' (prenatal) representations and later infant development and the father-infant attachment relationship. Additionally, it would be interesting to investigate whether the associations found between prenatal attachment and representations (*Chapter 4*) and the influence of personality characteristics and attachment style on the transition in representations from the prenatal to the postnatal period (*Chapter 5*) are also apparent in mothers.

Furthermore, additional research is needed to test the use of the risk inventory used in *Chapter 6* in clinical practice and to determine its predictive value, possibly also using other outcome measures such as aspects of child development. It would be interesting to expand the current list of risk factors so that it also includes more items concerning fathers, as the current risk inventory primarily concerned mothers. Finally, this thesis provided insight into various factors that are associated with risks of developing nonbalanced representations. However, it is yet unknown how parents with nonbalanced representations are best supported to positively alter their representations. Studies on the effects of clinical interventions or parenting support programs on the quality of parents' representations are therefore needed.

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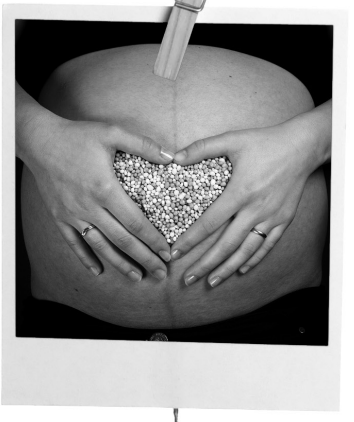

Samenvatting (Dutch Summary)

SAMENVATTING (DUTCH SUMMARY)

In de afgelopen decennia is veelvuldig aangetoond dat de kwaliteit van de ouder-kindrelatie verstrekkende gevolgen heeft voor de ontwikkeling van kinderen tot in de volwassenheid. Vanuit de relatie met de eigen ouders leert een jong kind hoe hij of zij interacties met anderen aan kan gaan. De ouder-kindrelatie kan worden gezien als een blauwdruk voor de manier waarop het kind in het verdere leven relaties aangaat. Veel studies naar de kwaliteit van de ouder-kindrelatie hebben zich gericht op interactief en observeerbaar gedrag tussen ouder en kind. Echter, de ouder-kindrelatie wordt niet alleen gevormd door observeerbare interacties tussen beiden, maar ook door verwachtingen en ideeën die zowel ouders als kinderen hebben over deze dagelijkse interacties. Dit worden ook wel interne werkmodellen, of *representaties* genoemd.

Om het concept van representaties te illustreren wordt onderscheid gemaakt tussen twee parallelle werelden. Ten eerste is er de daadwerkelijke, objectief waarneembare buitenwereld en ten tweede de verbeelde, subjectieve, mentale wereld van representaties. In het geval van de ouder-kindrelatie gaat het dan enerzijds om het kind dat daadwerkelijk in de armen van de ouder ligt, en anderzijds om het kind zoals het wordt voorgesteld in de gedachten van de ouder. Representaties zijn leidend voor het gedrag van ouders en voor de verwachtingen die zij van hun kinderen hebben. Eerder is aangetoond dat de kwaliteit van de representaties die ouders van hun (ongeboren) kinderen vormen gerelateerd is aan de kwaliteit van hun opvoedgedrag, de kwaliteit van de observeerbare ouder-kindinteracties en de kwaliteit van gehechtheidsrelaties van jonge kinderen.

Tot op heden is onderzoek naar representaties van ouders vooral bij moeders uitgevoerd. Dit is opvallend, omdat de kwaliteit van de vader-kindrelatie ook voorspellend is voor het cognitief- en sociaal-emotioneel functioneren van kinderen op latere leeftijd. Daarnaast is het meeste onderzoek in dit veld verricht bij ouders in de postnatale fase. Diverse onderzoeken hebben echter aangetoond dat ouders al tijdens de zwangerschap representaties vormen van hun nog ongeboren kinderen. Dit proefschrift had daarom als doel om de bestaande kennis over deze onderwerpen te vergroten.

De onderzoeken die zijn beschreven in dit proefschrift maken deel uit van de prospectieve, longitudinale cohortstudie "In Verwachting". De opzet van deze studie staat beschreven in **hoofdstuk 2**. Een belangrijk doel van deze studie was het onderzoeken van de kwaliteit van de ouder-kindrelatie tijdens de zwangerschap en in de eerste levensjaren van het kind. Dit proefschrift is met name gericht op het bestuderen van de kwaliteit van representaties die ouders hebben van hun (ongeboren) kinderen. Om deze representaties te beoordelen, werden vaders en moeders zowel in de prenatale- als postnatale periode geïnterviewd tijdens een huisbezoek. Het eerste gesprek vond plaats rondom de zesentwintigste week van de zwangerschap en het tweede gesprek werd gehouden toen de kinderen een half jaar oud waren. Tijdens de zwangerschap namen 308 moeders en 243 vaders deel aan de interviews, waarvan 294 moeders en 225 vaders ook aan het postnatale interview deelnamen.

In **hoofdstuk 3** wordt het Working Model of the Child Interview (WMCI) beschreven. Dit interview is speciaal ontworpen om ouders' representaties van hun kinderen te evalueren en kan zowel in de prenatale- als postnatale periode worden toegepast. Het WMCI is een semi-gestructureerd interview dat gemiddeld 45 minuten duurt. Om de kwaliteit van ouders' representaties te beoordelen, worden geluids- en/of video-opnames van het gesprek gecodeerd door een getrainde beoordelaar die betrouwbaar is gebleken in het scoren van het WMCI. Deze beoordelaar bepaalt op basis van een uitgebreid coderingsschema of ouders 'evenwichtige' (balanced) of 'onevenwichtige' (nonbalanced) representaties van hun kind hebben.

Ouders met *evenwichtige representaties* hechten in het algemeen veel waarde aan zowel de relatie met het kind als aan het kind als persoon. Deze ouders hebben oog voor de emoties en belevingen van het kind in verschillende situaties en staan open voor veranderingen als ze tot nieuwe inzichten over hun kind komen. Onevenwichtige representaties kunnen een afstandelijk (disengaged) of een verward (distorted) karakter hebben. *Afstandelijke representaties* worden gekenmerkt door een koele, onverschillige houding of sterk emotionele afstand ten opzichte van het kind. Deze ouders stellen zich afstandelijker op, hetgeen zich kan uiten in verstandelijke, rationele redeneringen of uitspraken en waarbij nauwelijks op emoties wordt gereflecteerd. Het lijkt vaak of deze ouders weinig over hun kind te vertellen hebben of ze spreken in zeer algemene termen. Ouders met *verwarde representaties* hebben vaak wel meer te vertellen over hun kinderen, maar deze representaties worden gekenmerkt door inconsistenties of vertekeningen. Beschrijvingen van hun kind zijn bij deze ouders vaak incoherent, verward, tegenstrijdig of zelfs bizar.

Vervolgens wordt in hoofdstuk 3 een literatuuroverzicht gegeven van eerdere studies die uitgevoerd zijn met het WMCI. Het doel hiervan was om meer inzicht te krijgen in factoren die samenhangen met de kwaliteit van representaties die ouders ontwikkelen van hun kinderen. Moeders bleken vaker evenwichtige representaties van hun kinderen te hebben wanneer er geen sprake was van medische of psychische problemen bij moeder of kind. Tevens werd duidelijk dat de kwaliteit van moeders' representaties samenhangt met de kwaliteit van moeder-kindinteracties, met sensitief gedrag van moeders en met gehechtheidsgedrag van kinderen. Opvallend was dat bovengenoemde onderzoeken alleen onder moeders werden uitgevoerd en dat ze geen informatie opleverden over representaties die vaders van hun kinderen ontwikkelen.

Hoofdstuk 4 van dit proefschrift richt zich op de gevoelens van vaders tijdens de zwangerschap ten opzichte van het ongeboren kind. Hierbij is gekeken naar vaders' representaties van hun ongeboren kinderen en de mate waarin vaders gevoelens van prenatale hechting rapporteerden. Prenatale representaties betreffen meer abstracte ideeën en beelden die vaders van hun ongeboren kind hebben, terwijl prenatale hechting meer gericht is op concrete gedragingen en gevoelens van zorg en toewijding ten opzichte van

het ongeboren kind. Uit dit onderzoek bleek dat vaders' representaties en gevoelens van prenatale hechting aan elkaar gerelateerd zijn. Vaders die sterkere gevoelens van prenatale hechting rapporteerden, hadden vaker evenwichtige representaties en vaders die minder sterke gevoelens van prenatale hechting rapporteerden, hadden vaker afstandelijke representaties. Weinig vaders hadden verwarde representaties van hun kinderen tijdens de zwangerschap. Tevens bleek dat vaders met sterkere gevoelens van prenatale hechting vaak jonger waren, een eerste kind verwachtten en minder gevoelens van angst of depressie rapporteerden. Deze kenmerken bleken niet samen te hangen met de kwaliteit van vaders' representaties.

De relatie tussen de kwaliteit van vaders' prenatale- en postnatale representaties van hun kinderen wordt beschreven in **hoofdstuk 5**. Hierbij is tevens gekeken naar de samenhang tussen vaders' representaties en specifieke eigenschappen van vaders, zoals persoonlijkheidskenmerken en de manier waarop zij in het algemeen relaties met anderen aangaan. Uit dit onderzoek bleek dat vaders' prenatale- en postnatale representaties aan elkaar gerelateerd waren. De kwaliteit van vaders' prenatale representaties bleek niet samen te hangen met specifieke eigenschappen van vaders. Echter, wanneer werd gekeken naar de transitie van prenatale- naar postnatale representaties, bleek dat vaders die prenataal onevenwichtige representaties hadden, vaker evenwichtige postnatale representaties ontwikkelden wanneer zij vriendelijker en minder wantrouwend waren. Dit laat zien dat wanneer vaders onevenwichtige representaties hebben tijdens de prenatale fase, een bepaalde groep vaders meer geneigd is deze representaties om te buigen naar evenwichtige representaties na de geboorte van hun kind.

In **hoofdstuk 6** zijn de verdelingen van vaders' en moeders' prenatale- en postnatale representaties direct met elkaar vergeleken. Hieruit bleek dat zowel tijdens de zwangerschap als daarna, vaders vaker afstandelijke representaties hadden en moeders vaker evenwichtige representaties. Zowel vaders als moeders hadden vaker afstandelijke representaties tijdens de zwangerschap dan wanneer kinderen geboren waren. Verder bleek dat de kwaliteit van ouders' prenatale representaties gerelateerd was aan de kwaliteit van ouders' postnatale representaties. Ouders die tijdens de zwangerschap een afstandelijke representatie hadden van het ongeboren kind, hadden vaker een afstandelijke representatie van het kind zes maanden na de geboorte.

Bovendien is in hoofdstuk 6 gekeken naar de samenhang tussen prenatale psychosociale risicofactoren binnen gezinnen en de kwaliteit van ouders' representaties van hun kinderen. Wanneer er meer prenatale risicofactoren in het gezin aanwezig waren, hadden moeders vaker verwarde prenatale representaties van hun ongeboren kind. Daarnaast hadden ouders in gezinnen met meer risicofactoren vaker afstandelijke representaties in de postnatale periode. Hieruit blijkt dat de aanwezigheid van één of meerdere psychosociale risicofactoren binnen een gezin tijdens de zwangerschap samenhangt met de kwaliteit van ouders' representaties wanneer kinderen zes maanden oud zijn.

In **hoofdstuk 7** worden de belangrijkste bevindingen van dit proefschrift samengevat. Vervolgens worden methodologisch sterke en zwakke punten van de studie, de klinische implicaties en overwegingen voor toekomstig onderzoek besproken. Dit proefschrift geeft inzicht in representaties die ouders van hun jonge kinderen ontwikkelen tijdens de zwangerschap en in de eerste maanden na de geboorte. Hierbij is met name bestudeerd welke factoren samenhangen met het ontwikkelen van evenwichtige representaties. Gebleken is dat diverse prenatale factoren samenhangen met de kwaliteit van ouders' representaties van hun kinderen in de postnatale fase. Het is van belang dat professionals die met zwangere vrouwen en hun gezinnen werken zich bewust worden van het feit dat al tijdens de zwangerschap geëvalueerd kan worden of belangrijke psychosociale risicofactoren binnen een gezin aanwezig zijn, en dat ook in deze periode al aandacht bestaat voor de representaties die zowel vaders als moeders van hun ongeboren kind ontwikkelen. Deze blijken immers samen te hangen met de kwaliteit van ouders' postnatale representaties, welke een belangrijke rol spelen in het vormen van het gedrag van ouders naar hun kinderen toe.


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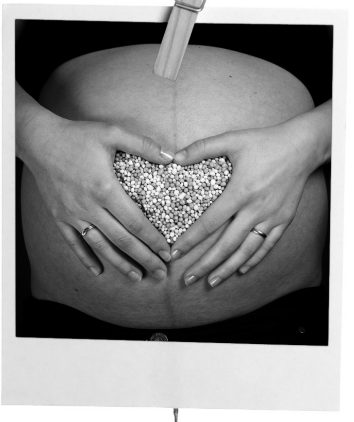

List of publications

LIST OF PUBLICATIONS

Maas, A. J. B. M., **Vreeswijk, C. M. J. M.**, Braeken, J., Vingerhoets, A. J. J. M., & van Bakel, H. J. A. (2013). Determinants of maternal fetal attachment in women from a community-based sample. *Journal of Reproductive and Infant Psychology*. Epub ahead of print. doi: 10.1080/02646838.2013.853170

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Under review

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In preparation

De Cock, E. S. A., Rijk, C. H. A. M., Maas, A. J. B. M., **Vreeswijk, C. M. J. M.**, & van Bakel, H. J. A. *Continuous feelings of love? The parental bond from pregnancy to toddlerhood.*

Maas, A. J. B. M., de Cock, E. S. A., **Vreeswijk, C. M. J. M.**, Vingerhoets, A. J. J. M., & van Bakel, H. J. A. *Maternal fetal attachment as an early predictor for maternal sensitivity at 6 months.*

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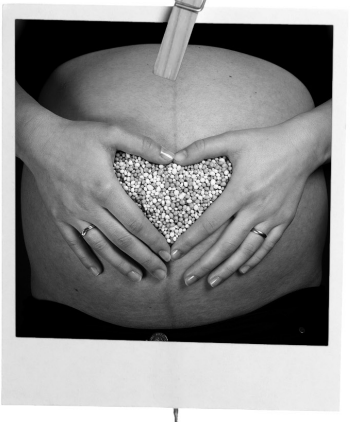

About the author

ABOUT THE AUTHOR

Charlotte Vreeswijk was born on December 23rd 1983 in Eindhoven, the Netherlands. During her teenage years, she moved to Vienna, Tennessee and New York and went to five different International and American secondary schools. In 2002 she received her International Baccalaureate (IB) at the International Secondary School Eindhoven. From 2002 to 2008 Charlotte studied psychology at Tilburg University. She completed the Master Psychology and Mental Health cum laude in 2006, specializing in clinical work with adults. In 2008, Charlotte worked as a psychologist and she graduated cum laude from the two-year Master Medical Psychology, with a focus on child and adolescent psychology. Subsequently, she started working as a PhD-student at the department of Developmental Psychology at Tilburg University, where she conducted the studies described in this thesis. Currently, Charlotte works as a teacher of psychology students at the Radboud University in Nijmegen. Charlotte is married to Jeroen de Vries and they have two children: A boy named Ruben (born on the 23rd of May 2011) and a girl named Jasmijn (born on the 20th of October 2012).

Charlotte Vreeswijk is geboren op 23 december 1983 te Eindhoven. Gedurende haar tienerjaren verhuisde zij naar Wenen, Tennessee en New York en ging zij naar vijf verschillende Internationale en Amerikaanse middelbare scholen. In 2002 behaalde zij het middelbare schooldiploma International Baccalaureate (IB) aan de International Secondary School Eindhoven. Van 2002 tot 2008 studeerde Charlotte psychologie aan Tilburg University. Ze rondde de Master Psychologie en Geestelijke Gezondheid cum laude af in 2006, in de richting volwassenen en ouderen. In 2008 werkte Charlotte als psycholoog en slaagde zij cum laude voor de Master Medische Psychologie, in de richting kinderen en jeugdigen. Vervolgens begon zij haar werk als promovenda bij het Departement Ontwikkelingspsychologie aan Tilburg University, waar ze het onderzoek verrichtte dat in dit proefschrift staat beschreven. Momenteel werkt Charlotte als docent psychologie aan de Radboud Universiteit Nijmegen. Charlotte is getrouwd met Jeroen de Vries en samen hebben zij twee kinderen: een jongen Ruben (geboren op 23 mei 2011) en een meisje Jasmijn (geboren 20 oktober 2012).